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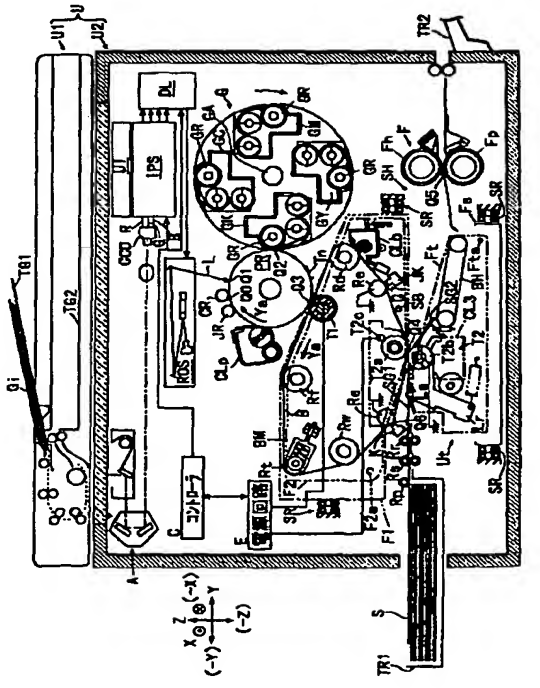
(54)【発明の名称】　画像形成装置

(57)【要約】
【課題】　２次転写時のトナーを転写する部分とトナーを転写しない非画像部分との電位差を小さくして、転写電界の非画像部への広がりを防止すること。
【解決手段】　表面にトナー像が形成された像担持体ＰＲと、光が照射された時に抵抗値が低下する光導電性物質を含有し光が照射されていない状態では高抵抗の誘電体である中間転写体Ｂと、像担持体ＰＲ上のトナー像を中間転写体Ｂ上に１次転写する１次転写器Ｔ1と、除電領域Ｑ7を通過する中間転写体Ｂを光照射により除電する光照射除電器ＪＫと、２次転写領域Ｑ4において前記１次転写トナー像を前記記録用シートＳに２次転写する２次転写器Ｔ2と、定着領域Ｑ5を通過する記録用シートＳ上の２次転写トナー像を定着する定着装置Ｆと、電位調整領域Ｑ6において中間転写体Ｂ上の電位を調整する中間転写体電位調整器Ｋとから構成される画像形成装置。



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【特許請求の範囲】

【請求項１】　次の要件（Ａ01）～（Ａ08）を備えたことを特徴とする画像形成装置、（Ａ01）帯電領域、潜像形成位置、現像領域、および１次転写領域を順次通過して回転移動するとともに、前記帯電領域通過時に帯電され、潜像形成位置通過時に静電潜像が形成され、現像領域通過時にトナー像が形成される表面を有する像担持体、（Ａ02）前記１次転写領域、電位調整領域、２次転写領域および除電領域を順次通過して回転移動する中間転写体であって、光が照射された時に抵抗値が低下する光導電性物質を含有し光が照射されていない状態では高抵抗の誘電体である前記中間転写体、（Ａ03）給紙トレイに収容された記録用シートを前記２次転写領域、定着領域およびシート排出部に順次搬送するシート搬送装置、（Ａ04）前記１次転写領域において像担持体上のトナー像を中間転写体上に１次転写する１次転写器、（Ａ05）前記２次転写領域において中間転写体上の１次転写トナー像を前記記録用シートに２次転写する２次転写器、（Ａ06）前記除電領域を通過する中間転写体を光照射により除電する光照射除電器、（Ａ07）前記定着領域を通過する記録用シート上の２次転写トナー像を定着する定着装置、（Ａ08）前記電位調整領域において中間転写体上の電位を調整する中間転写体電位調整器。

【請求項２】　次の要件（Ｂ01）～（Ｂ09）を備えたことを特徴とする画像形成装置、（Ｂ01）帯電領域、潜像形成位置、現像領域、および１次転写領域を順次通過して回転移動するとともに、前記帯電領域通過時に帯電され、潜像形成位置通過時に静電潜像が形成され、現像領域通過時にトナー像が形成される表面を有する像担持体、（Ｂ02）前記１次転写領域、電位調整領域、２次転写領域および除電領域を順次通過して回転移動する中間転写体であって、光が照射された時に抵抗値が低下する光導電性物質を含有し光が照射されていない状態では高抵抗の誘電体である前記中間転写体、（Ｂ03）給紙トレイに収容された記録用シートを前記２次転写領域、定着領域およびシート排出部に順次搬送するシート搬送装置、（Ｂ04）前記１次転写領域において像担持体上のトナー像を中間転写体上に１次転写する１次転写器、（Ｂ05）前記除電領域を通過する中間転写体を光照射により除電する光照射除電器、（Ｂ06）前記２次転写領域において中間転写体上の１次転写トナー像を前記記録用シートに２次転写する２次転写器、（Ｂ07）前記定着領域を通過する記録用シート上の２次転写トナー像を定着する定着装置、（Ｂ08）前記中間転写体の移動経路上に設定された電位調整領域において中間転写体上の電位を調整する中間転写体電位調整器、（Ｂ09）前記１次転写が行われる度に前記電位調整を実行する電位調整器制御手段。

【発明の詳細な説明】

【０００１】

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【発明の属する技術分野】本発明は、複写機、ファクシミリ、プリンタ等の電子写真方式を用いた画像形成装置に関し、特に、像担持体上に形成したトナー像を中間転写体に１次転写し、前記中間転写体上の１次転写トナーを記録用シートに２次転写するように構成した画像形成装置に関する。

【０００２】

【従来の技術】電子写真複写機等のカラー画像形成装置における画像形成方法（転写方法）としては、感光体ドラム等の像担持体上に形成されたトナー像（現像像）を一旦転写用紙以外の中間転写体上に１次転写した後、あらためて転写用紙上へ２次転写して複写像を得る方法が知られている。そしてこの方法を用いることで、転写用紙の保持状態、転写用紙の厚さやこし、転写用紙の表面性等多くの要因による、多重転写不良やカラーレジストレーションのズレの発生を抑制できることが知られている。前記中間転写体を使用した画像形成装置として、例えば次の従来技術（Ｊ01）が知られている。

【０００３】（Ｊ01）図８に示す技術

図８は中間転写体を使用した従来の画像形成装置の説明図である。図８において、画像形成装置Ｕは、自動原稿搬送装置Ｕ1とこれを支持するプラテンガラスＰＧを有する画像形成装置本体（複写機）Ｕ2とを備えている。前記自動原稿搬送装置Ｕ1は、複写しようとする複数の原稿Ｇiが重ねて載置される原稿給紙トレイＴＧ1と、原稿給紙トレイＴＧ1から前記プラテンガラスＰＧ上の複写位置（原稿読取位置）を通過して搬送される原稿Ｇiが排出される原稿排紙トレイＴＧ2とを有している。前記画像形成装置本体Ｕ2は、ユーザがコピースタート等の作動指令信号を入力操作するＵＩ（ユーザインタフェース）、露光光学系Ａ等を有している。前記自動原稿搬送装置Ｕ2でプラテンガラスＰＧ搬送される原稿または手動でプラテンガラスＰＧ上に置かれた原稿（図示せず）からの反射光は、前記露光光学系Ａを介して、ＣＣＤ（固体撮像素子）でＲ（赤）、Ｇ（緑）、Ｂ（青）の電気信号に変換される。ＩＰＳ（イメージプロセッシングシステム）は、前記ＲＧＢの電気信号をＫ（黒）、Ｙ（イエロー）、Ｍ（マゼンタ）、Ｃ（シアン）の画像データに変換して一時的に記憶し、前記画像データを所定のタイミングでレーザ駆動回路ＤＬに出力する。

【０００４】矢印Ｙa方向に回転移動する像担持体（感光体ドラム）ＰＲの表面は、帯電領域Ｑ0において帯電器ＣＲにより一様に帯電され、潜像形成位置Ｑ1、現像領域Ｑ2、および１次転写領域Ｑ3を順次通過する。前記レーザ駆動回路ＤＬにより駆動されるＲＯＳ（潜像書込装置）は、レーザビームＬにより前記潜像形成位置Ｑ1において露光走査し像担持体ＰＲ表面に静電潜像を形成する。フルカラー画像を形成する場合は、Ｋ（黒），Ｙ（イエロー），Ｍ（マゼンタ），Ｃ（シアン）の４色の画像に対応した静電潜像が順次形成され、モノクロ画像

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の場合はＫ（黒）画像に対応した静電潜像のみが形成される。

【０００５】前記静電潜像が形成された像担持体ＰＲ表面は回転移動して現像領域Ｑ2、１次転写領域Ｑ3を順次通過する。ロータリ式の現像装置Ｇは、回転軸ＧＡの回転に伴って前記現像領域Ｑ2に順次回転移動するＫ（黒），Ｙ（イエロー），Ｍ（マゼンタ），Ｃ（シアン）の４色の現像器ＧＫ，ＧＹ，ＧＭ，ＧＣを有している。前記各色の現像器ＧＫ，ＧＹ，ＧＭ，ＧＣは、前記現像領域Ｑ2に現像剤を搬送する現像ロールＧＲを有しており、現像領域Ｑ2を通過する像担持体ＰＲ上の静電潜像をトナー像Ｔnに現像する。現像剤としては例えば、トナーおよびキャリアを有する２成分現像剤が使用され、イエロー、マジェンタ、シアン、黒のトナーとしては負極帯電性のトナーが使用されている。

【０００６】前記像担持体ＰＲの下方には左右一対のスライドレールＳＲ，ＳＲによりスライドフレームＦ1（２点鎖線で表示）が前後（紙面に垂直な方向）にスライド移動可能に支持されている。スライドフレームＦ1にはベルトモジュールＢＭのベルトフレームＦ2がヒンジ軸Ｆ2a周りに上下に回動可能に支持されている。前記ベルトモジュールＢＭは、前記中間転写ベルト（ベルト状の中間転写体）Ｂを回転移動可能に支持する複数のベルト支持ロール（Ｒd，Ｒt，Ｒw，Ｒf，Ｔ2a）と、１次転写ロールＴ1と、それらを支持する前記ベルトフレームＦ2とを有している。前記複数のベルト支持ロール（Ｒd，Ｒt，Ｒw，Ｒf，Ｔ2a）は、ベルト駆動ロールＲd、テンションロールＲt、ウォーキングロールＲw、アイドラロール（フリーロール）ＲfおよびバックアップロールＴ2aを含んでいる。

【０００７】前記１次転写器Ｔ1は、コントローラＣが制御する電源回路Ｅによりトナーの帯電極性と逆極性の転写電圧が印加され、前記像担持体ＰＲ表面のトナー像Ｔnを、１次転写領域Ｑ3において中間転写ベルトＢに１次転写する。フルカラー画像の場合、像担持体ＰＲ表面に順次形成される各色のトナー像Ｔnは、前記１次転写領域Ｑ3において中間転写ベルトＢ表面に順次重ねて１次転写され、最終的にフルカラーの多重トナー像が中間転写ベルトＢ上に形成される。単色のモノカラー画像を形成する場合には１個の現像器のみを使用し、単色トナー像が中間転写ベルトＢ上に１次転写される。１次転写後、像担持体ＰＲ表面は、残留トナーが像担持体クリーナＣＬpによりクリーニングされ、像担持体除電器ＪＲにより除電される。

【０００８】前記バックアップロールＴ2aの下方には、左右一対のスライドレールＳＲ，ＳＲにより前後（紙面に垂直な方向）にスライド移動可能な２次転写スライドフレームＦsが、画像形成装置本体に対して着脱可能に支持されている。前記２次転写スライドフレームＦsによりヒンジ軸Ｆta周りに上下に回動可能に支持された２次転写ユニットＵtの２次転写昇降フレームＦtは、上昇した使用位置および下降した退避位置の間で昇降可能である。前記２次転写ユニットＵtは、２次転写ロールＴ2bと、２次転写ロールクリーナＣＬ3と、ロール支持レバーＬrと、転写後シートガイドＳＧ2と、シート搬送ベルトＢＨと、それらを支持する前記２次転写昇降フレームＦtと、を有している。

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【０００９】前記ロール支持レバーＬrは、前記２次転写ロールＴ2bを支持するレバーである。前記２次転写ユニットＵtが前記使用位置に移動した状態において、前記ロール支持レバーＬrは、図示しないモータによりヒンジ軸Ｌa周りに回動され、前記２次転写ロールＴ2bを、前記中間転写ベルトＢに接触する２次転写位置および中間転写ベルトＢから離れた待機位置の間で移動させる。前記２次転写ロールＴ2bおよび前記中間転写ベルトＢの接触領域により２次転写領域Ｑ4が形成され、前記２次転写ロールＴ2b、前記バックアップロールＴ2a、およびバックアップロールＴ2aに当接する金属製の電極ロールＴ2cにより２次転写器Ｔ2が構成されている。

【００１０】給紙トレイＴＲ1に収容された記録シートＳは、所定のタイミングでピックアップロールＲpにより取り出され、さばきロールＲsで１枚づつ分離されて、レジロールＲrに搬送される。前記レジロールＲrに搬送された記録シートＳは、前記１次転写された多重トナー像または単色トナー像が２次転写領域Ｑ4に移動するのにタイミングを合わせて、転写前シートガイドＳＧ1から２次転写領域Ｑ4に搬送される。前記２次転写領域Ｑ4を記録シートＳが通過する際、２次転写器Ｔ2の電極ロールＴ2cには、コントローラＣが制御する電源回路Ｅからトナーの帯電極性と同極性の２次転写電圧が印加される。前記２次転写器Ｔ2は、前記中間転写ベルトＢに重ねて１次転写されたカラートナー像を前記２次転写領域において一括して記録シートＳに２次転写する。２次転写後の中間転写ベルトＢはベルトクリーナＣＬbにより残留トナーが除去される。また、前記２次転写ロールＴ2bは２次転写ロールクリーナＣＬ3により表面付着トナーが回収される。

【００１１】なお、前記２次転写ロールＴ2bおよびベルトクリーナＣＬbは、中間転写ベルトＢに対して離接（離隔および接触）自在に配設されており、カラー画像が形成される場合には最終色の未定着トナー像が中間転写ベルトＢに１次転写されるまで、中間転写ベルトＢから離隔している。トナー像が２次転写された前記記録シートＳは、転写後シートガイドＳＧ2、シート搬送ベルトＢＨにより定着領域Ｑ5に搬送され、定着領域Ｑ5を通過する際に加熱ロールＦhおよび加圧ロールＦpにより構成される一対の定着ロールを有する定着装置Ｆにより加熱定着される。トナー像が定着された記録シートＳは、記録シート排出トレイＴＲ2に排出される。前記符号Ｒp，Ｒs，Ｒr，ＳＧ1，ＳＧ2，ＢＨで示された要素によりシー

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ト搬送装置ＳＨが構成されている。

【００１２】

【発明が解決しようとする課題】（前記従来技術（Ｊ01）の問題点）前記従来技術（Ｊ01）の中間転写体を用いた画像形成装置において、その中間転写体にはこれまで高分子材料中にカーボンや金属化合物などのフィラーを導電剤として分散させたものなどが用いられている（特開平８－３２０６２２号公報参照）。しかし、このように形成された中間転写体の抵抗とトナー像の画質には密接な関係があることが知られており、抵抗値が低すぎると、転写時のトナーの飛び散りが著しく発生し画質が低下する（特開平０８－２４８７７９号公報参照）。中間転写体の抵抗値が低すぎる場合、１次転写ロールによる転写電界と転写電流の作用で、トナー層のない領域に転写電界がかかりやすくなるために転写領域が広がり、その作用によってトナーが飛び散って転写されてしまうためと考えられる。

【００１３】また中間転写体の抵抗値が高い場合、さらには誘電体などの場合には、トナー画像領域における中間転写体の電荷保持性が増加し、転写に必要な電界を適切にトナーへ印加することができる。一方、隣接する非画像部の中間転写体表面および内部の電荷移動は減少する為、１次及び２次転写においてこの領域へのトナー転写が起こり難くなる。このことにより中間転写体の抵抗値が高い場合、さらには誘電体などの場合には、トナーの飛び散りが少なく良好な画質のトナー形成像が得られる。しかし、この場合はトナー転写後に電荷が中間転写体に蓄積するため、そのままでは次の画像形成時に悪影響を及ぼしてしまう。また、中間転写体の平均的な抵抗値が良好な抵抗値幅にあったとしても、次のような問題点が挙げられる。すなわちカーボンや金属化合物などのフィラーを高分子樹脂に分散した場合には、フィラーの分散状態に起因する中間転写体内の抵抗バラツキが約１桁以上と大きいこと、フィラーとフィラー間の微少な高分子樹脂部の絶縁破壊や通電によるフィラーの再配列などによる中間転写体の低抵抗化が経時で起こることなどである。このように、中間転写体の抵抗が、部分的に或いは全体的に良好な抵抗値幅から外れ、画像品質を著しく低下させるという問題があった。

【００１４】そこで我々は特願平１０－１２３９９９号（特開平　－　号公報）で光導電性を有する中間転写体を提案した。これは従来のカーボンブラックなどの導電粉を分散した中抵抗の中間転写体とは異なり、第１及び２次転写時には誘電体としての高抵抗を有している。このため第１及び２次転写時に電界が広がることなく良好な画像を得ることができるものである。そして第１及び２次転写後にはそれぞれ転写電界によって中間転写体上に電荷が蓄積されるが、２次転写後に中間転写体上を光照射することで、非接触に且つオゾンなどを発生することなく電荷を除電することができるもの

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である。

【００１５】図９は前記特願平１０－１２３９９９号（特開平　－　号公報）のような高抵抗の光導電性中間転写体を使用して、像担持体（感光体）から中間転写体にトナー像を転写する場合のトナー像およびその周囲の電位を示す図で、図９Ａは像担持体上の電位を示す図、図９Ｂは中間転写体上の電位を示す図、図９Ｂ′は４回目の１次転写後に中間転写体表面の電位を示す図、図９Ｃは２次転写電界を示す図である。図９Ａ、図９Ｂにおいて、転写時には高抵抗を有するこの光導電性中間転写体の転写特性として、転写目的であるトナー像も含めて１次転写時に感光体が有していた電位分布も１次転写時に中間転写体に転写している。このため中間転写体上に転写されたトナー像を含む画像部より周辺の非画像部電位の方が高くなっており、トナー像は拘束され周辺に飛び散ることない。

【００１６】（第１の問題点）図９Ｂ′において、１次転写を１回目～４回目まで行うと転写トナー像が一側に大きくなる。図９Ｃにおいて、２次転写ロールの表面電位（２次転写電圧）と中間転写体の非画像部との電位差が２次転写ロールの表面電位と画像部との電位差に対して大きいときには２次転写電界が非画像部に広がって、画像部の転写電界が低下している。すなわち、前記光導電性中間転写体における第１の問題として特に高温高湿下等で用紙の抵抗値が低い場合の２次転写時には、転写電界は電位差が大きい非画像部に広がり、トナーも飛び散ってしまうため画像のにじみが発生し良好な画像を得るのが難しくなっていた。

【００１７】（第２の問題点）第２の問題として光導電性物質を含む中間転写体においても最終的なトナー転写効率は従来の中抵抗の中間転写体を用いた場合と同程度であり、画像の構造や色の再現性及びランニングコストの観点からさらなる高転写効率を実現することが求められてきた。

（第３の問題点）第３の問題点としては、この中間転写体は１次転写時に誘電体としての高抵抗を持つことから、カラー画像形成時など複数回にわたりトナー画像を中間転写体上に転写するとき第２色目め以降では順次１次転写電圧を高くしていくことが必要であった。このため特に最終色トナーの１次転写時には高電圧が印加されており、より容量の大きな電源が必要でありコストを上げる要因となっていた。

【００１８】本発明は前述の事情（及び検討結果）に鑑み、光導電性物質を含む中間転写体を使用した画像形成装置において、下記（Ｏ01），（Ｏ02）の記載内容を課題とする。

（Ｏ01）２次転写時の画像部（トナーを転写する部分）と非画像部（トナーを転写しない部分、画像の背景部）との電位差を小さくすることにより、転写電界の非画像部への広がりを防止すること。

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（Ｏ02）中間転写体上に異なる色のトナー像を重ねて１次転写する場合に、低電圧の１次転写電源により良好に１次転写を行えるようにすること。

【００１９】

【課題を解決するための手段】次に、前記課題を解決するために案出した本発明を説明するが、本発明の要素には、後述の実施例の要素との対応を容易にするため、実施例の要素の符号をカッコで囲んだものを付記する。なお、本発明を後述の実施例の符号と対応させて説明する理由は、本発明の理解を容易にするためであり、本発明の範囲を実施例に限定するためではない。

【００２０】（第１発明）前記第１および第２の問題点を解決するため、第１発明の画像形成装置は、次の要件（Ａ01）～（Ａ08）を備えたことを特徴とする、（Ａ01）帯電領域（Ｑ0）、潜像形成位置（Ｑ1）、現像領域（Ｑ2）、および１次転写領域（Ｑ3）を順次通過して回転移動するとともに、前記帯電領域（Ｑ0）通過時に帯電され、潜像形成位置（Ｑ1）通過時に静電潜像が形成され、現像領域（Ｑ2）通過時にトナー像が形成される表面を有する像担持体（ＰＲ）、（Ａ02）前記１次転写領域（Ｑ3）、電位調整領域（Ｑ6）、２次転写領域（Ｑ4）および除電領域（Ｑ7）を順次通過して回転移動する中間転写体（Ｂ）であって、光が照射された時に抵抗値が低下する光導電性物質を含有し光が照射されていない状態では高抵抗の誘電体である前記中間転写体（Ｂ）、（Ａ03）給紙トレイ（ＴＲ1）に収容された記録用シート（Ｓ）を前記２次転写領域（Ｑ4）、定着領域（Ｑ5）およびシート排出部に順次搬送するシート搬送装置（ＳＨ）、（Ａ04）前記１次転写領域（Ｑ3）において像担持体（ＰＲ）上のトナー像を中間転写体（Ｂ）上に１次転写する１次転写器（Ｔ1）、（Ａ05）前記２次転写領域（Ｑ4）において中間転写体（Ｂ）上の１次転写トナー像を前記記録用シート（Ｓ）に２次転写する２次転写器（Ｔ2）、（Ａ06）前記除電領域（Ｑ7）を通過する中間転写体（Ｂ）を光照射により除電する光照射除電器（ＪＫ）、（Ａ07）前記定着領域（Ｑ5）を通過する記録用シート（Ｓ）上の２次転写トナー像を定着する定着装置（Ｆ）、（Ａ08）前記電位調整領域（Ｑ6）において中間転写体（Ｂ）上の電位を調整する中間転写体電位調整器（Ｋ）。

【００２１】（第１発明の作用）前記構成を備えた第１発明の画像形成装置では、帯電領域（Ｑ0）、潜像形成位置（Ｑ1）、現像領域（Ｑ2）、および１次転写領域（Ｑ3）を順次通過して回転移動する像担持体（ＰＲ）の表面は、前記帯電領域（Ｑ0）通過時に帯電され、潜像形成位置（Ｑ1）通過時に静電潜像が形成され、現像領域（Ｑ2）通過時にトナー像が形成される。光が照射された時に抵抗値が低下する光導電性物質を含有し光が照射されていない状態では高抵抗の誘電体である前記中間転写体（Ｂ）は、前記１次転写領域（Ｑ3）、電位調整領域（Ｑ6）、２次転写領域（Ｑ4）および除電領域（Ｑ7）を順次通過して回転移動する。シート搬送装置（ＳＨ）は、給紙トレイ（ＴＲ1）に収容された記録用シート（Ｓ）を前記２次転写領域（Ｑ4）、定着領域（Ｑ5）およびシート排出部に順次搬送する。

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【００２２】１次転写器（Ｔ1）は、前記１次転写領域（Ｑ3）において像担持体（ＰＲ）上のトナー像を中間転写体（Ｂ）上に１次転写する。光照射除電器（ＪＫ）は、前記除電領域（Ｑ7）を通過する中間転写体（Ｂ）を光照射により除電する。２次転写器（Ｔ2）は、前記２次転写領域（Ｑ4）において中間転写体（Ｂ）上の１次転写トナー像を前記記録用シート（Ｓ）に２次転写する。定着装置（Ｆ）は、前記定着領域（Ｑ5）を通過する記録用シート（Ｓ）上の２次転写トナー像を定着する。前記電位調整領域（Ｑ6）において中間転写体電位調整器（Ｋ）は、中間転写体（Ｂ）上の電位を調整する。

【００２３】従来より提案されていたカーボンブラックなどの導電性フィラーを分散した中抵抗の中間転写体とは異なり、光導電性中間転写体（Ｂ）は第１及び２次転写時には誘電体としての高抵抗値を保持している。この為、図５Ａ、図５Ｂのように１次転写後には感光体が画像形成時に保持していた電位分布を光導電性中間転写体表面も持つことになる。反転現像の場合では中間転写体（Ｂ）上に形成されたトナー画像周辺はより電位の高い状態となっているため転写トナー像は周辺に散らばることなく良好な１次転写像が得られる。

【００２４】しかし特に高温高湿下で用紙の抵抗値が低い状態では２次転写電界が非画像部に広がった状態（図９Ｃ参照）になり、この電界の広がりに沿う形でトナーが転写されるため良好な画像を得るのは困難となる。したがって光導電性中間転写体に１次転写後、２次転写前に光照射し、光導電性中間転写体の非画像部の表面電位とトナー画像部の表面電位差を小さくすることにより（図５Ｃ参照）２次転写時における転写電界の広がりを抑えることができ、トナー画像が散らばることなく紙などの最終転写材に転写することができる。ただしこの場合、非画像部の電位を画像部の電位より低くしてしまう程光照射してしまうと、同極性に帯電したトナー同士の反発力や非画像部からの電界によりトナー層が散らばり、周辺に飛び散った画像になってしまう。

【００２５】さらに別の方法としてコロナ放電現象を用いることができる。この場合はコロトロンに交流と直流の電圧を重畳して印加し中間転写体表面をコロトロンに印加する直流電圧値近傍にレベリングする方法である。例えば感光体及び中間転写ベルトが負帯電性で反転現像の場合等ではコロトロンに印加する直流電圧を中間転写ベルト上の画像部、非画像部の中間の電位に設定する。図６は中間転写体電位調整器としてコロトロンを使用した場合の電位調整のメカニズムの説明図で、図６Ａはコ

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ロトロンに印加する直流電圧を中間転写ベルト上の画像部、非画像部の中間の電位に設定した場合の画像部および非画像部の電位が変化する状態の説明図、図６Ｂはコロトロンがコロナ放電をしたとき画像部および非画像部の電位の変化する様子を示す図、図６Ｃ電位が変化した後の画像部および非画像部の電位状態を示す図である。図６において、コロトロンに印加する直流電圧を中間転写ベルト上の画像部、非画像部の中間の電位に設定することでコロトロンの直流電圧値ＶＤＣより電位の低い画像部にはマイナス成分の電流が流れ印加した直流電圧値ＶＤＣ近傍まで帯電される。またコロトロンの直流電圧値ＶＤＣより電位の高い非画像部にはプラス成分の電流が流れ印加した直流電圧値ＶＤＣ近傍まで下げることができる。この場合、前記コロトロンによるコロナ放電により図６Ｂの状態が図６Ｃの状態となる。

【００２６】これらのことにより画像部と非画像部の電位レベルの差が小さくなるので、高温高湿下で抵抗値が低下した用紙に２次転写を実施しても電界の広がり、すなわち転写トナーの飛び散りを抑制することができる。またこのとき画像部のトナー層にはさらに電荷が付加されているので、転写電界がより強くなり転写効率を向上することができる。さらには非画像部にあるかぶりトナーは電荷が下がるためもしくは逆極性に転じる事により、かぶりトナーの転写を抑制できる。

【００２７】（第２発明）前記第３の問題点を解決するため、第２発明の画像形成装置は、次の要件（Ｂ01）～（Ｂ09）を備えたことを特徴とする、（Ｂ01）帯電領域（Ｑ0）、潜像形成位置（Ｑ1）、現像領域（Ｑ2）、および１次転写領域（Ｑ3）を順次通過して回転移動するとともに、前記帯電領域（Ｑ0）通過時に帯電され、潜像形成位置（Ｑ1）通過時に静電潜像が形成され、現像領域（Ｑ2）通過時にトナー像が形成される表面を有する像担持体（ＰＲ）、（Ｂ02）前記１次転写領域（Ｑ3）、電位調整領域（Ｑ6）、２次転写領域（Ｑ4）および除電領域（Ｑ7）を順次通過して回転移動する中間転写体（Ｂ）であって、光が照射された時に抵抗値が低下する光導電性物質を含有し光が照射されていない状態では高抵抗の誘電体である前記中間転写体（Ｂ）、（Ｂ03）給紙トレイ（ＴＲ1）に収容された記録用シート（Ｓ）を前記２次転写領域（Ｑ4）、定着領域（Ｑ5）およびシート排出部に順次搬送するシート搬送装置（ＳＨ）、（Ｂ04）前記１次転写領域（Ｑ3）において像担持体（ＰＲ）上のトナー像を中間転写体（Ｂ）上に１次転写する１次転写器（Ｔ1）、（Ｂ05）前記除電領域（Ｑ7）を通過する中間転写体（Ｂ）を光照射により除電する光照射除電器（ＪＫ）、（Ｂ06）前記２次転写領域（Ｑ4）において中間転写体（Ｂ）上の１次転写トナー像を前記記録用シート（Ｓ）に２次転写する２次転写器（Ｔ2）、（Ｂ07）前記定着領域（Ｑ5）を通過する記録用シート（Ｓ）上の２次転写トナー像を定着する定着

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装置（Ｆ）、（Ｂ08）前記中間転写体（Ｂ）の移動経路上に設定された電位調整領域（Ｑ6）において中間転写体（Ｂ）上の電位を調整する中間転写体電位調整器（Ｋ）、（Ｂ09）前記１次転写が行われる度に前記電位調整を実行する電位調整器制御手段（Ｃ7′）。

【００２８】（第２発明の作用）前記構成を備えた第２発明の画像形成装置では、帯電領域（Ｑ0）、潜像形成位置（Ｑ1）、現像領域（Ｑ2）、および１次転写領域（Ｑ3）を順次通過して回転移動する像担持体（ＰＲ）の表面は、前記帯電領域（Ｑ0）通過時に帯電され、潜像形成位置（Ｑ1）通過時に静電潜像が形成され、現像領域（Ｑ2）通過時にトナー像が形成される。光が照射された時に抵抗値が低下する光導電性物質を含有し光が照射されていない状態では高抵抗の誘電体である中間転写体（Ｂ）は、前記１次転写領域（Ｑ3）、電位調整領域（Ｑ6）、２次転写領域（Ｑ4）および除電領域（Ｑ7）を順次通過して回転移動する。シート搬送装置（ＳＨ）は、給紙トレイ（ＴＲ1）に収容された記録用シート（Ｓ）を前記２次転写領域（Ｑ4）、定着領域（Ｑ5）およびシート排出部に順次搬送する。

【００２９】１次転写器（Ｔ1）は、前記１次転写領域（Ｑ3）において像担持体（ＰＲ）上のトナー像を中間転写体（Ｂ）上に１次転写する。光照射除電器（ＪＫ）は、前記除電領域（Ｑ7）を通過する中間転写体（Ｂ）を光照射により除電する。前記２次転写領域（Ｑ4）において２次転写器（Ｔ2）は、中間転写体（Ｂ）上の１次転写トナー像を前記記録用シート（Ｓ）に２次転写する。定着装置（Ｆ）は、前記定着領域（Ｑ5）を通過する記録用シート（Ｓ）上の２次転写トナー像を定着する。

【００３０】前記中間転写体（Ｂ）の移動経路上に設定された電位調整領域（Ｑ6）において中間転写体電位調整器（Ｋ）は、中間転写体（Ｂ）上の電位を調整する。電位調整器制御手段（Ｃ7′）は、前記１次転写が行われる度に前記電位調整を実行する。前記電位調整は光照射またはコロナ放電により行うことができる。

【００３１】すなわち、前記１次転写後に中間転写体（Ｂ）上に光照射することで、中間転写体（Ｂ）に転写された画像形成時の感光体電位分布を調整することができる。このときの電位レベルは画像部の中間転写体表面の電位とその上に形成されているトナー像電位をあわせたレベル以上とする。この場合も２次転写時と同様、非画像部の電位を低くするとトナー像は周辺に飛び散ってしまう。１次転写中の中間転写体電位レベルを下げることで、２色目以降のトナー像を転写する場合でも１次転写電圧が大きく上昇することを防止できる。コロトロンなどによる放電現象で中間転写体表面をトナー層も含めて電位調整した場合も同様中間転写体（Ｂ）の全体としての電位を下げることができ１次転写電圧が大きく上昇することを防止できる。なお、中間転写体（Ｂ）上の画

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像部と非画像部の電位は１次と２次転写の設定により変わるものであり、またコロトロン等により調整する電位も随時必要に応じて設定すればよい。

【００３２】

【実施の形態】（実施の形態１）本発明の画像形成装置の実施の形態１は、前記第１または第２発明において下記の要件（ＡＢ01）を備えたことを特徴とする、

（ＡＢ01）中間転写体（Ｂ）に光を照射する光照射器により構成された前記中間転写体電位調整器（Ｋ）。

【００３３】（実施の形態１の作用）前記構成をそなえた本発明の画像形成装置の実施の形態１では、前記中間転写体電位調整器（Ｋ）は、中間転写体（Ｂ）に光を照射する光照射器により構成される。光導電性物質を含む前記中間転写体（Ｂ）は、光照射によりの電位を調整することができる。

【００３４】（実施の形態２）本発明の画像形成装置の実施の形態２は、前記第１または第２発明において下記の要件（ＡＢ02）を備えたことを特徴とする、

（ＡＢ02）コロナ放電器により構成された前記中間転写体電位調整器（Ｋ）。

【００３５】（実施の形態２の作用）前記構成をそなえた本発明の画像形成装置の実施の形態２では、前記中間転写体電位調整器（Ｋ）は、コロナ放電器により構成される。前記中間転写体（Ｂ）は、コロナ放電器により電位を調整することができる。

【００３６】（実施例）次に図面を参照しながら、本発明の実施の形態の具体例（実施例）を説明するが、本発明は以下の実施例に限定されるものではない。

【００３７】（実施例１）図１は本発明の実施例１の画像形成装置の全体説明図である。図１に示す本実施例１の画像形成装置Ｕの説明において、前記図８に示す従来の画像形成装置の構成要素と同一の構成要素には、前記図８で使用した符号と同一の符号を付して、その詳細な説明は省略する。図１に示した本発明の画像形成装置の実施例１は、前記図８に示した従来の画像形成装置と略同一に構成されているが、下記の点で相違している。

【００３８】前記図１に示した画像形成装置の２次転写領域Ｑ4の中間転写ベルトＢの搬送方向上流側に設定された電位調整領域Ｑ6には赤色ＬＥＤ（光照射器）により構成された中間転写体電位調整器Ｋが配置されている。中間転写ベルトＢを挟んで前記中間転写体電位調整器Ｋと対向する位置にはアースロール（アースされたロール）Ｒeが配置されている。前記中間転写体電位調整

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器Ｋによる光照射により中間転写ベルトＢの電位が調整される。前記図１に示した画像形成装置の２次転写領域Ｑ4の中間転写ベルトＢの搬送方向下流側に設定された中間転写体除電領域Ｑ7には赤色ＬＥＤ（光照射器）により構成された光照射除電器ＪＫが配置されている。中間転写ベルトＢを挟んで前記光照射除電器ＪＫと対向する位置にはアースされたアイドラロールＲeが配置されている。中間転写体除電領域Ｑ7において前記光照射除電器ＪＫによる光照射により中間転写ベルトＢが除電される。前記中間転写体電位調整器Ｋおよび光照射除電器ＪＫに印加される電圧は電源回路Ｅ（図１参照、配線は図示せず）から供給される。

【００３９】（２次転写器Ｔ2）前記バックアップロールＴ2aと、このバックアップロールＴ2aから離れた離隔位置および押圧される近接位置の間で離接可能（離隔および接近可能）に配置された２次転写ロールＴ2bと、前記バックアップロールＴ2aに当接する金属製の電極ロールＴ2cとにより２次転写器Ｔ2が構成される。前記バックアップロールＴ2aは導電性の金属ロールに半導電性の弾性体を巻き付けて構成されており、例えばその表面抵抗率は1×10^{7}Ω／□以上に調整されている。また、前記アースされた２次転写ロールＴ2bは金属ロールの表面をカーボン分散発砲ウレタンで包み、その外側を半導電性の薄層フィルムで被服し、例えばその体積抵抗率は10^{9}Ωｃｍに調整されている。

【００４０】（中間転写ベルトＢ）図２は本発明の画像形成装置の実施例１で使用されている中間転写ベルトの構成を示す図である。前記画像形成装置の実施例１で使用されている中間転写ベルト（ベルト状の中間転写体）Ｂは次のように構成されている。図２において前記中間転写ベルトＢは、４層構造で、裏面から表面側に向かって順次ベルト基材Ｂ1、ブロッキング層Ｂ2a、電荷発生層Ｂ2b、および電荷輸送層Ｂ2cが積層されている。なお、前記電荷発生層Ｂ2b、電荷輸送層Ｂ2cにより光導電層Ｂ2が構成されている。

（ベルト基材Ｂ1）カーボン黒を１５重量%添加したポリイミド樹脂により構成され、膜厚７５μｍに形成されている。体積抵抗率は$10^{9.5}$Ωｃｍ、表面抵抗は10^{12}Ω／□に設定されている。

【００４１】（ブロッキング層Ｂ2a）ブロッキング層（Ｂ2a）は、例えば次のようにして形成することができる。

アセチルアセトンジルコニウムブトキシド（オルガチックスＺＣ５４０、松本交商社製）　２０重量部

γ－アミノプロピルトリエトキシシラン　２重量部

ポリビニルブチラール樹脂（エスレックＢＭ－Ｓ、積水化学（株）製）　１．５重量部

ｎ－ブチルアルコール　７０重量部

上記成分からなる溶液を、基材（Ｂ1）表面に塗布後、乾燥させて例えば０．９μｍに形成する。前記ブロッキ

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ング層（Ｂ2a）は－（マイナス）極性のキャリアである電子の移動は許すが＋（プラス）極性キャリアであるホールの移動は阻止する機能を有する。

【００４２】（電荷発生層Ｂ2b）フタロシアニン顔料系電荷発生剤を添加したＰＶＫ（Poly vinyl carbazole、ポリビニルカルバゾール）により形成された膜厚０．２５μｍの層である。光が照射されると、＋（プラス）および－（マイナス）の電荷を発生する。

【００４３】（電荷輸送層（ホール輸送層）Ｂ2c）トリフェニルアミン系電荷輸送剤を添加したポリカーボネート樹脂により構成され、膜厚２５μｍである。＋（プラス）極性のキャリアであるホールの移動は許すが－（マイナス）極性キャリアである電子の移動は阻止する機能を有する。すなわち、本実施例１の電荷輸送層Ｂ2cはホール輸送層である。

【００４４】（実施例１の制御部の説明）図３は前記実施例１の制御部のブロック線図である。前記コントローラＣには、ＵＩ（ユーザインタフェース）が接続されており、ＵＩは、コピースタートキー（ジョブスタートキー）ＵＩａ、フルカラーモード選択キーＵＩｂ、テンキーＵＩｃ、表示器ＵＩｄ等を有している。前記コントローラＣには次のセンサの検出信号が入力されている。

ＳＮＢ：ベルト位置センサ

ベルト位置センサＳＮＢ（図１、図３参照）は中間転写ベルトＢに付けたマーク（目印）を検出し、検出信号を前記コントローラＣに出力する。

ＳＮ1：シートサイズセンサ

シートサイズセンサＳＮ1は、シート（用紙）通過の有無および用紙サイズ（シートサイズ）を検出ためのセンサであり、検出信号を前記コントローラＣに出力する。なお、前記コントローラＣには、図示しない排紙センサ、定着装置温度センサ、その他のセンサの検出信号が入力される。

【００４５】前記ＵＩ（ユーザインタフェース）、前記各種センサＳＮＢ，ＳＮ1，…からの信号が入力される前記コントローラＣは、前記ＩＰＳの作動タイミング制御信号、レーザ駆動信号出力装置ＤＬの作動タイミング制御信号、中間転写ベルトＢを回転駆動するためのベルト駆動モータＭを駆動するベルト駆動回路Ｄ、電源回路Ｅの１次転写用電源回路Ｅ1、２次転写用電源回路Ｅ2、中間転写体電位調整用電源Ｅ3、除電器用電源回路Ｅ4等の作動制御信号を出力している。前記コントローラＣの出力する制御信号に応じて、中間転写体電位調整用電源Ｅ3は前記中間転写体電位調整器Ｋを駆動し、除電器用電源回路Ｅ4は光照射除電器ＪＫを駆動する。

【００４６】前記種々の入力信号に応じた処理を実行する前記コントローラＣは、外部との信号の入出力および入出力信号レベルの調節等を行うＩ／Ｏ（入出力インタフェース）、必要な処理を行うためのプログラムおよびデータ等が記憶されたＲＯＭ（リードオンリーメモリ）、必要なデータを一時的に記憶するためのＲＡＭ（ランダムアクセスメモリ）、ならびに、前記ＲＯＭに記憶されたプログラムに応じた入出力制御および演算処理等を行うＣＰＵ（中央演算処理装置）等を有するコンピュータにより構成されており、前記ＲＯＭに記憶されたプログラムを実行することにより種々の機能を実現することができる。すなわち、コントローラＣは次の機能を有している。

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【００４７】Ｃ1：ベルト位置検出手段

ベルト位置検出手段Ｃ1は、前記ベルト位置センサＳＮＢが前記ベルトマークＭＫを検出した時刻からの経過時間を計測することにより中間転写ベルトＢの回転位置を検出している。

Ｃ2：シートサイズ検出手段

シートサイズ検出手段Ｃ2は、前記シートサイズセンサＳＮ1が検出するシート（用紙）先端および後端の通過時刻によりシート（用紙）搬送方向のシートサイズを検出する。

【００４８】Ｃ3：書込タイミング通知信号出力手段

書込タイミング通知信号出力手段Ｃ3は、前記ベルト位置センサＳＮＢのベルトマーク検出信号に基づいて、書込タイミング通知信号を前記ＩＰＳおよびレーザ駆動信号出力装置ＤＬに出力している。すなわち、前記ベルト位置センサＳＮＢがベルトマークを検出してから所定時間後に、中間転写ベルトＢ上のトナー像転写開始位置が前記１次転写領域Ｑ3に到達するので、それにタイミングを合わせて像担持体ＰＲ上に形成されるトナー像の前端を前記１次転写位置Ｑ3に到達させる必要がある。そのためには、所定のタイミングで前記ＲＯＳによる潜像形成位置Ｑ1への画像書込を開始する必要がある。このために、書込タイミング通知信号出力手段Ｃ3は、前記書込タイミング通知信号を出力しているのである。なお、前記ＩＰＳおよびレーザ駆動信号出力装置ＤＬは前記書込タイミング通知信号が出力されてから所定のタイミングでレーザ駆動信号出力装置ＤＬからレーザ駆動信号をＲＯＳに出力する。

【００４９】Ｃ4：ベルト制御手段

ベルト制御手段はＣ4は、前記中間転写ベルトＢを回転駆動するベルト駆動モータＭのベルト駆動回路Ｄの制御信号を出力する。

Ｃ5：１次転写器制御手段

１次転写器制御手段Ｃ5は、１次転写領域Ｑ3を中間転写ベルトＢの画像形成領域が通過する際に１次転写器Ｔ1に一定の１次転写電流または電圧を印加する。

Ｃ6：２次転写器制御手段

２次転写器制御手段Ｃ6は、２次転写領域Ｑ3を中間転写ベルトＢの画像形成領域が通過する際、２次転写を行うため２次転写器Ｔ2に一定の２次転写電流または電圧を印加する。

【００５０】Ｃ7：電位調整器制御手段

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電位調整器制御手段Ｃ7は、中間転写ベルトＢの２次転写領域Ｑ4上流側の電位調整領域Ｑ6を通過する中間転写ベルトＢ表面の電位を調整する中間転写体電位調整器（赤色ＬＥＤ）Ｋの点灯制御信号を出力する。

【００５１】Ｃ8：除電器点灯制御手段

除電器点灯制御手段Ｃ8は、中間転写ベルトＢの２次転写が行われた部分が除電領域Ｑ7を通過する際、前記光照射除電器ＪＫを点灯するように除電器点灯制御信号を前記除電器用電源回路Ｅ4（図３参照）に出力する。

【００５２】前記除電器点灯制御手段Ｃ7を有するコントローラＣおよび除電器用電源回路Ｅ4により、光源制御回路（Ｃ＋Ｅ4）が構成されている。前記除電器点灯制御手段Ｃ7を有するコントローラＣ、除電器用電源回路Ｅ4、光照射除電器ＪＫにより抵抗率制御装置（Ｃ＋Ｅ4＋ＪＫ）が構成されている。

【００５３】（電位調整器Ｋおよび光照射除電器ＪＫの作動タイミング）図４は実施例１の１次転写器Ｔ1、中間転写体電位調整器Ｋ、２次転写器Ｔ2、および光照射除電器ＪＫのタイムチャートである。図４において、この実施例１の画像形成装置の中間転写体電位調整器Ｋ

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は、複数回の１次転写終了後（４色のトナー像の中の最終転写トナー像の１次転写終了後）で２次転写前に光照射による光導電性中間転写体の電位調整を行うように制御される。また、前記光照射除電器ＪＫは２次転写終了後に光照射による中間転写ベルトＢの除電を行うように制御される。

【００５４】（実施例１の作用）次に、この実施例１の画像形成装置を使用して、高温高湿下（２８℃、８５％）で画像形成動作を行った場合の作用について説明する。

（用紙）用紙は高温高湿下（２８℃、８５％）で１２時間保管し、充分抵抗値が下がった状態にした。このときの用紙の体積抵抗率を Kethly 487 Picoammeter及び8009 Resistiolity test fixtureにおいて測定したところ、$4.58\times10^{8}\ \Omega\cdot cm$であった。

【００５５】（１次転写電圧）表１は実施例１，２の１次転写後の露光無しの場合に必要な１次転写ロール直流印加電圧と、後述の実施例３，４の露光有りの場合に必要な１次転写ロール直流印加電圧を示す表である。

【表１】

（表１）　１次転写ロール直流印加電圧

	１次転写後の露光	
	無	有
１次転写 1cycle 後	380V	380V
１次転写 2cycle 後	480V	410V
１次転写 3cycle 後	650V	460V
１次転写 4cycle 後	800V	490V

１次転写電流：６μＡ

表１に示したように、１次転写電流を６μＡ流すためには、実施例１の１次転写ロールＴ1に印加する正電圧（露光無しの場合の電圧）は１次転写後の露光有り（後述の実施例３，４参照）の場合より高い電圧が必要である。

【００５６】表２は実施例１，２の１次転写後の露光無しの場合（電位調整器Ｋの調整無しの場合）の１次転写電圧および中間転写体表面電位と、後述の実施例３の露光有りの場合に必要な１次転写電圧および中間転写体表面電位とを示す表である。

【表２】

（表２）光導伝性中間転写体の表面電位と一次転写電圧

	１次転写後の露光無し		１次転写後の露光有り	
	中間転写体表面電位	１次転写電圧	中間転写体表面電位	１次転写電圧
１次転写 1cycle 後	-125V	380V	-90V	380V
１次転写 2cycle 後	-300V	480V	-185V	410V
１次転写 3cycle 後	-450V	650V	-260V	460V
１次転写 4cycle 後	-625V	800V	-350V	490V
２次転写前露光後	-400V	—	—	—
２次転写後	-110V	—	-80V	—
２次転写後露光後	-20V	—	-15V	—

【００５７】前記１次転写ロールＴ1には６μＡの定電流制御の正電圧を印加し、１色目から４色目まで順次印加電圧を変化させたときの、１次転写ロール直流印加電圧は前記表１に示すとおりであり、中間転写体表面の非画像部電位は次のとおり（表２参照）である。

１色目転写後：－１２５Ｖ、

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２色目転写後：－３００Ｖ、
３色目転写後：－４５０Ｖ、
４色目転写時：－６２５Ｖ。

【００５８】４色目の１次転写後でかつ２次転写前に赤色ＬＥＤにより構成した中間転写体電位調整器Ｋにより中間転写体表面の電位調整を行ったときの露光後（電位調整後）の非画像部電位は－４００Ｖであった。図５は実施例１の高抵抗の光導電性中間転写体（中間転写ベルト）Ｂを使用して、像担持体（感光体）ＰＲから中間転写体Ｂにトナー像を転写する場合のトナー像およびその周囲の電位を示す図で、図５Ａは像担持体ＰＲ上の電位を示す図、図５Ｂは中間転写体Ｂ上の電位を示す図で１次転写を繰り返す毎に電位（－電位）が上昇することを示す図、図５Ｂ′は４回目の１次転写後に露光することにより中間転写体表面の電位が低下することを示す図、図５Ｃは中間転写体Ｂ表面の画像電位と非画像電位との差が小さくなったために２次転写電界の非画像部への広がりが無くなった状態を示す図である。図５Ｃの状態では、前記図９Ｃと比較して、２次転写電界の非画像部への広がりが無くなったために、トナーの飛び散り等が減少する。

（２次転写電圧）本実施例１では前記図５Ｃの状態で、２次転写ロールＴ2bには１０００Ｖの定電圧を印加し転写を行った。

【００５９】（画像パターン）プリントサンプルの画像パターンには２種類用意し１枚目はイエロー、マジェンタ、シアン、黒各単色、２次色、３次色の２ｃｍ角大のソリッド及び黒トナー単色による大きさの異なる漢字をセットにしたものとし、２枚目は黒トナー単色の４００ｌｉｎｅ／ｉｎｃｈのハーフトーン画像とし、２種のサンプルを交互に出力した。１枚目のプリントの２次転写直後での中間転写体表面電位は－７０Ｖから－１００Ｖ程度の画像パターンに応じた表面電位ムラがあったが、光照射除電器ＪＫによる光照射後には中間転写体の表面電位は－１０Ｖから－３０Ｖの間でほぼ均一となり、次のプリントサンプルである４００ｌｉｎｅ／ｉｎｃｈのハーフトーン画像においても濃度ムラや飛び散りの無い均一な画像が得られた。２種のプリントサンプルを交互に合計２００００枚出力したが濃度ムラ、飛び散り、画像の太りの無い良好な画像が得られた。

【００６０】（実施例２）本発明の画像形成装置の実施例２は、次の点で前記実施例１の画像形成装置と相違しているが、他の点では前記実施例１と同様に構成されている。前記実施例１では光照射器により構成された中間転写体電位調整器Ｋを使用していたのに対し、本実施例２では、スコトロンにより構成された中間転写体電位調整器Ｋを使用した点。この実施例２の画像形成装置の中間転写体電位調整器Ｋおよび光照射除電器ＪＫの作動タイミングは前記実施例１と同様である。すなわち、タイミングチャートは前記図４と同様である。すなわち、中

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間転写体電位調整器Ｋは、複数回の１次転写終了後（４色のトナー像の中の最終転写トナー像の１次転写終了後）で２次転写前に光照射による光導電性中間転写体の電位調整を行うように制御される。また、光照射除電器ＪＫは２次転写終了後のみ除電を行うように制御される。

【００６１】（実施例２の作用）次に、この実施例２の画像形成装置を使用して、高温高湿下（２８℃、８５％）で画像形成動作を行った場合の作用について説明する。

（用紙）用紙は前記実施例１と同様の用紙を使用した。

（１次転写電圧）１次転写ロールＴ1には６μＡの定電流制御の正電圧を印加し、１色目から４色目まで順次印加電圧が変化できるようにした。このときの中間転写体表面の非画像部電位は次のとおりであった。

１色目転写後：－１２５Ｖ、
２色目転写後：－３００Ｖ、
３色目転写後：－４５０Ｖ、
４色目転写時：－６２５Ｖ。

【００６２】４色目の１次転写後でかつ２次転写前にスコロトロンにより構成した中間転写体電位調整器Ｋにより中間転写体表面の電位調整を行ったときの露光後（電位調整後）の非画像部電位は－４００Ｖであった。

（２次転写電圧）２次転写ロールＴ2bには１０００Ｖの定電圧を印加し転写を行った。

【００６３】（画像パターン）プリントサンプルの画像パターンには２種類用意し１枚目はイエロー、マジェンタ、シアン、黒各単色、２次色、３次色の２ｃｍ角大のソリッド及び黒トナー単色による大きさの異なる漢字をセットにしたものとし、２枚目は黒トナー単色の４００ｌｉｎｅ／ｉｎｃｈのハーフトーン画像とし、２種のサンプルを交互に出力した。１枚目のプリントの２次転写直後での中間転写体表面電位は－７０Ｖから－１００Ｖ程度の画像パターンに応じた表面電位ムラがあったが、光照射除電器ＪＫによる電位調整後には中間転写体の表面電位は－１０Ｖから－３０Ｖの間でほぼ均一となり、次のプリントサンプルである４００ｌｉｎｅ／ｉｎｃｈのハーフトーン画像においても濃度ムラや飛び散りの無い均一な画像が得られた。２種のプリントサンプルを交互に合計２００００枚出力したが濃度ムラ、飛び散り、画像の太りの無い良好な画像が得られた。

【００６４】（実施例３）本発明の画像形成装置の実施例３は、次の点で前記実施例１の画像形成装置と相違しているが、他の点では前記実施例１と同様に構成されている。この実施例３の画像形成装置では、中間転写体電位調整器Ｋの作動タイミングが前記実施例１と相違している。図７は実施例３の１次転写器Ｔ1、中間転写体電位調整器Ｋ、２次転写器Ｔ2、および光照射除電器ＪＫのタイムチャートである。前記実施例１の中間転写体電位調整器Ｋは、複数回の１次転写終了後（４色のトナー

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像の中の最終転写トナー像の１次転写終了後）で２次転写前に光照射による光導電性中間転写体の電位調整を行うように制御されていたのに対して、この実施例３の中間転写体電位調整器Ｋは、図７に示すように、１次転写終了毎に、光照射による光導電性中間転写体の電位調整を行うように制御される。前記中間転写体電位調整器Ｋの制御は、実施例３のコントローラＣの電位調整器制御手段Ｃ7′により行われる。

【００６５】（実施例３の作用）次に、この実施例３の画像形成装置を使用して、高温高湿下（２８℃、８５％）で画像形成動作を行った場合の作用について説明する。

（用紙）用紙は前記実施例１と同様の用紙を使用した。

（１次転写電圧）１次転写ロールＴ1には６μＡの定電流制御の正電圧を印加し、１色目から４色目まで順次印加電圧が変化できるようにした。このとき各色のトナーの１次転写後ごとに中間転写体電位調整器Ｋ（赤色ＬＥＤ）による光照射を行い、中間転写体表面電位の調整を随時実施した。このときの中間転写体表面の非画像部電位は次のとおりであった。

１色目転写後：－９０Ｖ、
２色目転写後：－１８５Ｖ、
３色目転写後：－２６０Ｖ、
４色目転写時：－３５０Ｖ。

【００６６】前記表１は実施例３の１次転写後の露光有りの場合の１次転写ロール直流印加電圧と、比較のための露光無しの場合に必要な１次転写ロール直流印加電圧が示されている。。前記表１に示したように、１次転写ロールＴ1に印加する正電圧は１次転写後に露光しない場合より低い電圧となっている。

【００６７】前記表２には実施例３の１次転写後の露光有りの場合（電位調整器Ｋの調整有りの場合）の１次転写電圧および中間転写体表面電位と、比較のための露光無しの場合に必要な１次転写電圧および中間転写体表面電位とが示されている。

【００６８】（２次転写電圧）２次転写ロールＴ2bには１０００Ｖの定電圧を印加し転写を行った。

【００６９】（画像パターン）プリントサンプルの画像パターンには２種類用意し１枚目はイエロー、マジェンタ、シアン、黒各単色、２次色、３次色の２ｃｍ角大のソリッド及び黒トナー単色による大きさの異なる漢字をセットにしたものとし、２枚目は黒トナー単色の４００ｌｉｎｅ／ｉｎｃｈのハーフトーン画像とし、２種のサンプルを交互に出力した。１枚目のプリントの２次転写直後での中間転写体表面電位は－６０Ｖから－８０Ｖ程度の画像パターンに応じた表面電位ムラがあったが、光照射除電器ＪＫによる光照射後には中間転写体の表面電位は－１０Ｖから－３０Ｖの間でほぼ均一となり、次のプリントサンプルである４００ｌｉｎｅ／ｉｎｃｈのハーフトーン画像においても濃度ムラや飛び散りの無い均一な画像が得られた。２種のプリントサンプルを交互に合計２００００枚出力したが濃度ムラ、飛び散り、画像の太りの無い良好な画像が得られた。

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【００７０】（実施例４）本発明の画像形成装置の実施例４は、次の点で前記実施例１の画像形成装置と相違しているが、他の点では前記実施例１と同様に構成されている。前記実施例１では光照射器により構成された中間転写体電位調整器Ｋを使用していたのに対し、本実施例４では、スコトロンにより構成された中間転写体電位調整器Ｋを使用している。また、この実施例４の画像形成装置では、中間転写体電位調整器Ｋの作動タイミングが前記実施例１と相違している。すなわち、前記実施例１の中間転写体電位調整器Ｋは、複数回の１次転写終了後（４色のトナー像の中の最終転写トナー像の１次転写終了後）で２次転写前に光照射による光導電性中間転写体の電位調整を行うように制御されていたのに対して、この実施例４の中間転写体電位調整器Ｋは１次転写終了毎に、スコロトロンのコロナ放電（直流及び交流電圧を重畳）により光導電性中間転写体の電位調整を行うように制御される。したがって、実施例４のタイムチャートは前記実施例３のタイムチャート（図７参照）と同一である。

【００７１】（実施例４の作用）次に、この実施例４の画像形成装置を使用して、高温高湿下（２８℃、８５％）で画像形成動作を行った場合の作用について説明する。

（用紙）用紙は前記実施例１と同様の用紙を使用した。

（１次転写電圧）１次転写ロールＴ1には６μＡの定電流制御の正電圧を印加し、１色目から４色目まで順次印加電圧が変化できるようにした。このとき各色のトナーの１次転写後ごとに中間転写体電位調整器（スコロトロン）Ｋによるコロナ放電を行い、中間転写体表面電位の調整を行った。このときの中間転写体電位調整器（スコロトロン）Ｋに印加する直流電圧は次のとおりであった。

１色目転写後：－９０Ｖ、
２色目転写後：－１７５Ｖ、
３色目転写後：－２４０Ｖ、
４色目転写時：－３３０Ｖ。

【００７２】この場合、中間転写体電位調整器（スコロトロン）Ｋによる電位調整後の中間転写体表面の非画像部電位は次のとおりであった。

１色目転写後：－１００Ｖ、
２色目転写後：－１９５Ｖ、
３色目転写後：－２７０Ｖ、
４色目転写時：－３６０Ｖ。

【００７３】（２次転写電圧）２次転写ロールＴ2bには１０００Ｖの定電圧を印加し転写を行った。

【００７４】（画像パターン）プリントサンプルの画像パターンには２種類用意し１枚目はイエロー、マジェン

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タ、シアン、黒各単色、２次色、３次色の２ｃｍ角大のソリッド及び黒トナー単色による大きさの異なる漢字をセットにしたものとし、２枚目は黒トナー単色の４００ｌｉｎｅ／ｉｎｃｈのハーフトーン画像とし、２種のサンプルを交互に出力した。１枚目のプリントの２次転写直後での中間転写体表面電位は－６０Ｖから－８０Ｖ程度の画像パターンに応じた表面電位ムラがあったが、光照射除電器ＪＫによる光照射後には中間転写体の表面電位は－１０Ｖから－３０Ｖの間でほぼ均一となり、次のプリントサンプルである４００ｌｉｎｅ／ｉｎｃｈのハーフトーン画像においても濃度ムラや飛び散りの無い均一な画像が得られた。２種のプリントサンプルを交互に合計２００００枚出力したが濃度ムラ、飛び散り、画像の太りの無い良好な画像が得られた。

【００７５】（比較例）比較例として中間転写体電位調整器Ｋを設けない画像形成装置の動作を説明する。

（比較例の作用）次に、前記比較例の画像形成装置を使用して、高温高湿下（２８℃、８５％）で画像形成動作を行った場合の作用について説明する。

（用紙）用紙は前記実施例１と同様の用紙を使用した。

（１次転写電圧）１次転写ロールＴ1には６μＡの定電流制御の正電圧を印加し、１色目から４色目まで順次印加電圧が変化できるようにした。このとき各色のトナーの１次転写後の中間転写体表面電位は次のとおりであった。

１色目転写後：－１２５Ｖ、
２色目転写後：－３００Ｖ、
３色目転写後：－４５０Ｖ、
４色目転写時：－６２５Ｖ。

【００７６】（２次転写電圧）２次転写ロールＴ2bには１０００Ｖの定電圧を印加し転写を行った。

【００７７】（画像パターン）プリントサンプルの画像パターンには２種類用意し１枚目はイエロー、マジェンタ、シアン、黒各単色、２次色、３次色の２ｃｍ角大のソリッド及び黒トナー単色による大きさの異なる漢字をセットにしたものとし、２枚目は黒トナー単色の４００ｌｉｎｅ／ｉｎｃｈのハーフトーン画像とし、２種のサンプルを交互に出力した。１枚目のプリントの２次転写直後での中間転写体表面電位は－８０Ｖから－１１０Ｖ程度の画像パターンに応じた表面電位ムラがあったが、光照射除電器ＪＫによる光照射後には中間転写体の表面電位は－１０Ｖから－３０Ｖの間でほぼ均一となり、次のプリントサンプルである４００ｌｉｎｅ／ｉｎｃｈのハーフトーン画像においては、高温高湿下での用紙抵抗低下と転写電界の偏りによるものと考えられる濃度ムラや飛び散りが発生している画像となった。

【００７８】（変更例）以上、本発明の実施例を詳述したが、本発明は、前記実施例に限定されるものではなく、特許請求の範囲に記載された本発明の要旨の範囲内で、種々の変更を行うことが可能である。本発明の変更

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実施例を下記に例示する。

（Ｈ01）本発明で使用する中間転写体は複数の像担持体を備えたタンデム式の画像形成装置でも使用可能である。

（Ｈ02）２次転写器Ｔ2は、バックアップロールＴ2a、２次転写ロールＴ2b、および前記バックアップロールＴ2aに当接するコンタクトロールにより構成することが可能である。

（Ｈ03）前記実施例においてはカーボンブラックを分散した最下層表面上に下地層、電荷発生層、電荷輸送層の順に膜形成した４層構造の中間転写体を用いた例を示したが、中間転写体を光導電性をもつ単層のみ、もしくはカーボンブラック等を分散した下地層表面上に光導電層を形成した２層とした場合でも同様の作用で良好な画質を安定して得ることができる。

（Ｈ04）前記実施例の光照射による中間転写体の電位調整は中間転写体表面側から行っているが、光導電性中間転写体が単層の場合や、複層でも最下層が透過性の場合には裏面から光照射を行うことが可能である。

【００７９】

【発明の効果】前述の本発明の画像形成装置は、下記の効果を奏することができる。

（Ｅ01）２次転写時の画像部（トナーを転写する部分）と非画像部（トナーを転写しない部分、画像の背景部）との電位差を小さくすることにより、転写電界の非画像部への広がりを防止することができる。したがって、高温高湿下など用紙抵抗値が低下した場合でもトナー画像が飛び散ることなく良好な画像のまま転写することができる。

（Ｅ02）１次転写時には誘電体としての高抵抗を有する光導電性中間転写体においても印加する１次転写電圧が大きく上昇することなく複数回の１次転写を連続して行うことができる。したがって、中間転写体上に異なる色のトナー像を重ねて１次転写する場合に、低電圧の１次転写電源により良好に１次転写を行うことができる。

【図面の簡単な説明】

【図１】　図１は本発明の実施例１の画像形成装置の全体説明図である。

【図２】　図２は本発明の画像形成装置の実施例１で使用されている中間転写ベルトの構成を示す図である。

【図３】　図３は前記実施例１の制御部のブロック線図である。

【図４】　図４は実施例１の１次転写器Ｔ1、中間転写体電位調整器Ｋ、２次転写器Ｔ2、および光照射除電器ＪＫのタイムチャートである。

【図５】　図５は実施例１の高抵抗の光導電性中間転写体（中間転写ベルト）Ｂを使用して、像担持体（感光体）ＰＲから中間転写体Ｂにトナー像を転写する場合のトナー像およびその周囲の電位を示す図で、図５Ａは像担持体ＰＲ上の電位を示す図、図５Ｂは中間転写体Ｂ上

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の電位を示す図で１次転写を繰り返す毎に電位（－電位）が上昇することを示す図、図５Ｂ′は４回目の１次転写後に露光することにより中間転写体表面の電位が低下することを示す図、図５Ｃは中間転写体Ｂ表面の画像電位と非画像電位との差が小さくなったために２次転写電界の非画像部への広がりが無くなった状態を示す図である。

【図６】　図６は中間転写体電位調整器としてコロトロンを使用した場合の電位調整のメカニズムの説明図で、図６Ａはコロトロンに印加する直流電圧を中間転写ベルト上の画像部、非画像部の中間の電位に設定した場合の画像部および非画像部の電位が変化する状態の説明図、図６Ｂはコロトロンがコロナ放電をしたとき画像部および非画像部の電位の変化する様子を示す図、図６Ｃ電位が変化した後の画像部および非画像部の電位状態を示す図である。

【図７】　図７は実施例３の１次転写器Ｔ1、中間転写体電位調整器Ｋ、２次転写器Ｔ2、および光照射除電器ＪＫのタイムチャートである。

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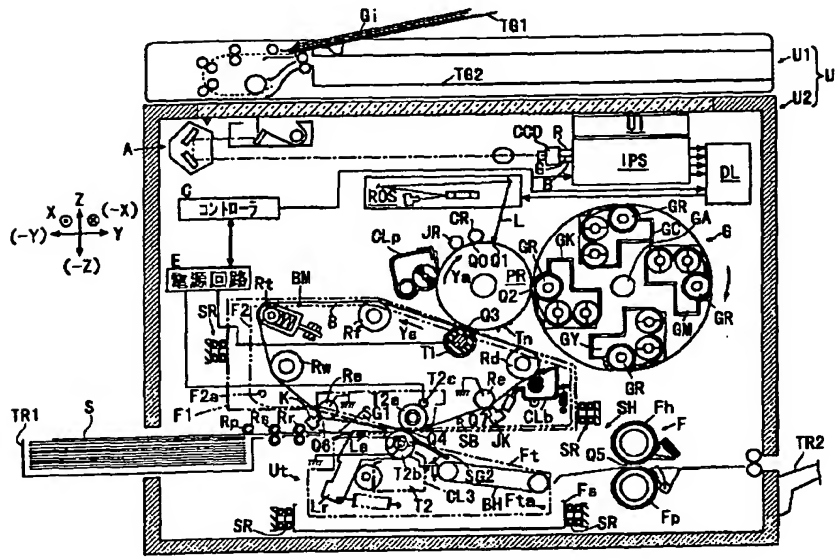
【図８】　図８は中間転写体を使用した従来の画像形成装置の説明図である。

【図９】　図９は前記特願平１０－１２３９９９号（特開平　　－号公報）のような高抵抗の光導電性中間転写体を使用して、像担持体（感光体）から中間転写体にトナー像を転写する場合のトナー像およびその周囲の電位を示す図で、図９Ａは像担持体上の電位を示す図、図９Ｂは中間転写体上の電位を示す図、図９Ｂ′は４回目の１次転写後に中間転写体表面の電位を示す図、図９Ｃは２次転写電界を示す図である。

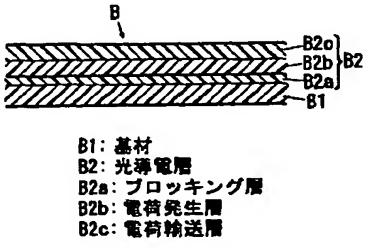
【符号の説明】

Ｂ…中間転写体、Ｃ7′…電位調整器制御手段、Ｆ…定着装置、ＪＫ…光照射除電器、Ｋ…中間転写体電位調整器、Ｑ0…帯電領域、Ｑ1…潜像形成位置、Ｑ2…現像領域、Ｑ3…１次転写領域、Ｑ4…２次転写領域、Ｑ5…定着領域、Ｑ6…電位調整領域、Ｑ7…除電領域、ＰＲ…像担持体、Ｓ…記録用シート、ＳＨ…シート搬送装置、Ｔ1…１次転写器、Ｔ2…２次転写器、ＴＲ1…給紙トレイ。

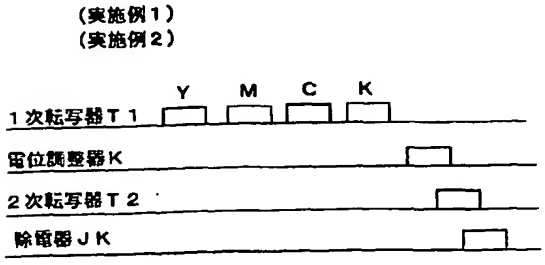
【図１】



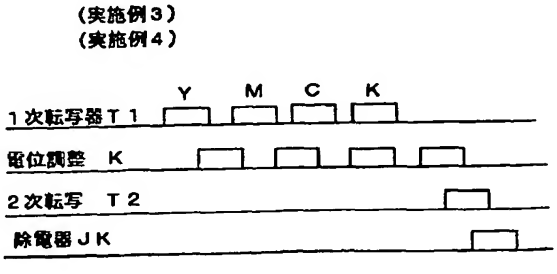
【図２】



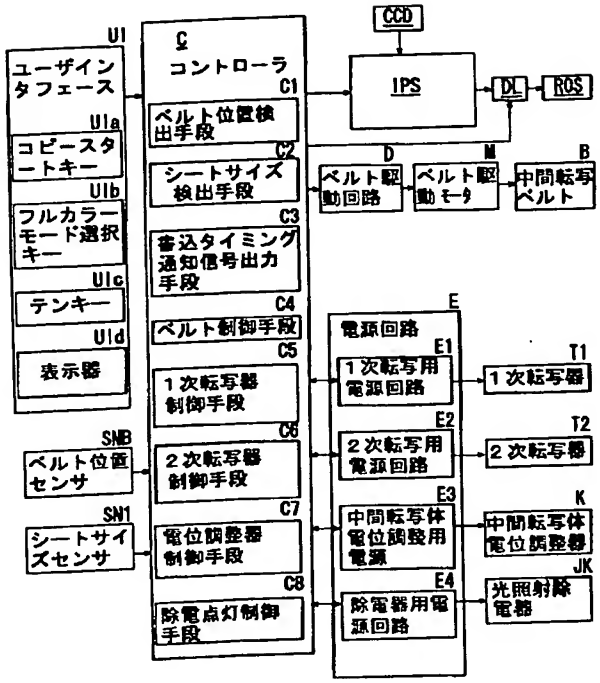
【図４】



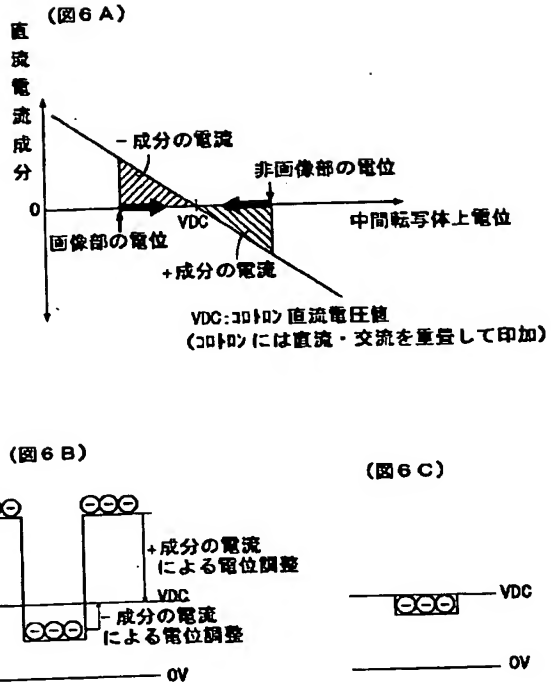
【図７】



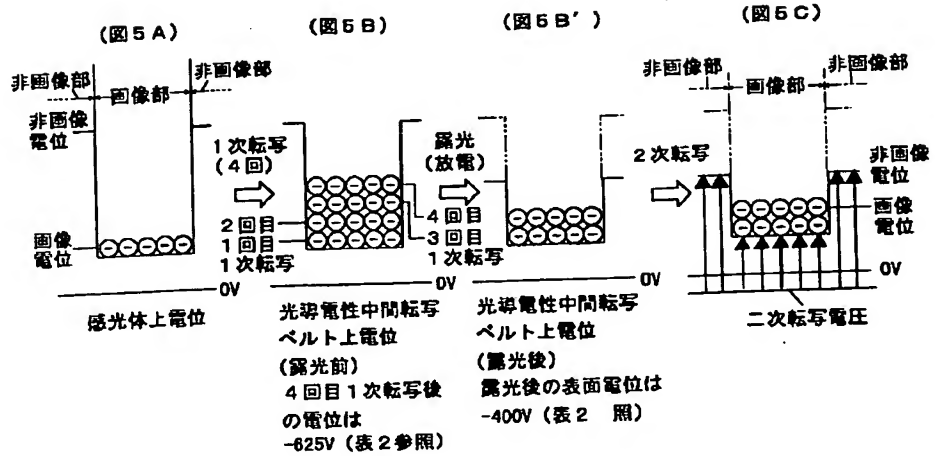
【図３】


U1
ユーザインタフェース
U1a
コピースタートキー
U1b
フルカラーモード選択キー
U1c
テンキー
U1d
表示器
C
コントローラ
C1
ベルト位置検出手段
C2
シートサイズ検出手段
C3
書込タイミング通知信号出力手段
C4
ベルト制御手段
C5
１次転写器制御手段
C6
２次転写器制御手段
C7
電位調整器制御手段
C8
除電点灯制御手段
SNB
ベルト位置センサ
SN1
シートサイズセンサ
CCD
IPS
DL
ROS
D
ベルト駆動回路
M
ベルト駆動モータ
B
中間転写ベルト
E
電源回路
E1
１次転写用電源回路
T1
１次転写器
E2
２次転写用電源回路
T2
２次転写器
E3
中間転写体電位調整用電源
K
中間転写体電位調整器
E4
除電器用電源回路
JK
光照射除電器

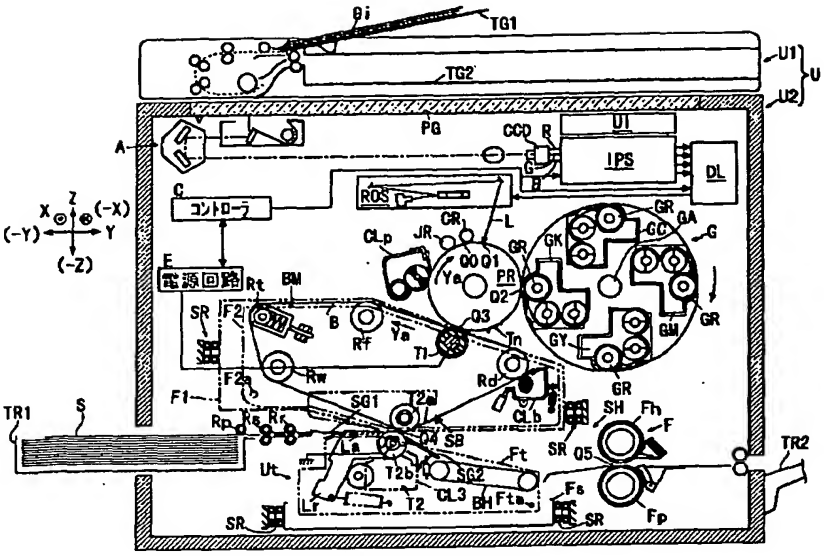
【図６】


(図６Ａ)
直流電流成分
－成分の電流
非画像部の電位
0
VDC
中間転写体上電位
画像部の電位
＋成分の電流
VDC:コロトロン直流電圧値
(コロトロンには直流・交流を重畳して印加)
(図６Ｂ)
＋成分の電流による電位調整
VDC
－成分の電流による電位調整
0V
(図６Ｃ)
VDC
0V

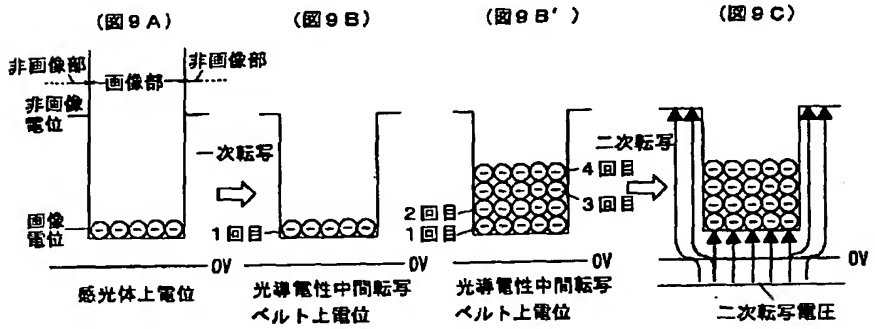
【図５】


(図５Ａ)
非画像部
画像部
非画像部
非画像電位
画像電位
0V
感光体上電位
(図５Ｂ)
１次転写(４回)
２回目
１回目
１次転写
0V
光導電性中間転写ベルト上電位
(露光前)
４回目１次転写後の電位は
-625V（表２参照）
(図５Ｂ′)
露光(放電)
４回目
３回目
１次転写
0V
光導電性中間転写ベルト上電位
(露光後)
露光後の表面電位は
-400V（表２　照）
(図５Ｃ)
非画像部
画像部
非画像部
２次転写
非画像電位
画像電位
0V
二次転写電圧

【図８】



【図９】



フロントページの続き

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BB42 BB44 BB55
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BA21 BA26 CA02 CA13
2H072 AA36 AB18 AB19 AB20 BA03
BA12 CA01 CA02 CA05

IMAGE FORMING DEVICE

Patent Number: JP2000267458
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IPC Classification: G03G15/16; G03G15/00; G03G15/01
EC Classification:
Equivalents:

Abstract

PROBLEM TO BE SOLVED: To reduce a potential difference between a part where toner is transferred at secondary transfer and a non-image part where the toner is not transferred, and to prevent a transfer electric field from extending to the non-image part.
SOLUTION: The device is provided with an image carrier PR having a surface on which a toner image is formed, and an intermediate transfer body B containing photoconductive material whose resistance value is reduced when the material is irradiated with light, and functioning as a high-resistance dielectric body when the body is not irradiated with light. Besides, the device is provided with a primary transfer device T1 for primarily transferring the toner image on the image carrier PR on to the intermediate transfer body B, a light irradiating/destaticizing device JK for destaticizing the intermediate transfer body B passing through a destaticizing area by the irradiation of light, a secondary transfer device T2 for secondarily transferring the primarily transferred toner image to a recording sheet S in a secondary transfer area Q4, a fixing device F for fixing the secondarily transferred image on the recording sheet passing through a fixing area Q5, and an intermediate transfer body potential adjusting device K for adjusting the potential on the intermediate transfer body B in a potential adjusting area Q6.

* NOTICES *

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3.In the drawings, any words are not translated.

CLAIMS

[Claim(s)]
[Claim 1] While passing through the image formation equipment characterized by having following requirement (A01) - (A08), an electrification (A01) field, a latent-image formation position, a development field, and a primary imprint field one by one and rotating It is charged at the time of the aforementioned electrification field passage, and an electrostatic latent image is formed at the time of latent-image formation position passage. The image support which has the front face in which a toner image is formed at the time of development field passage, the aforementioned (A02) primary imprint field, It is the middle imprint object which passes through a potential coordination area, a secondary imprint field, and an electric discharge field one by one, and rotates. The aforementioned middle imprint object which is a dielectric of high resistance in the state where contain the photoconductivity matter with which resistance falls when light is irradiated, and light is not irradiated, The sheet for record held in the medium tray The aforementioned secondary imprint field, (A03) The sheet transport device conveyed one by one in a fixing field and the sheet eccrisis section, the primary imprint machine which imprints the primary toner image on an image support on a middle imprint object in the aforementioned (A04) primary imprint field, The secondary imprint machine which imprints the secondary primary imprint toner image on a middle imprint object on the aforementioned sheet for record in the aforementioned secondary imprint field, (A05) The optical irradiation electric discharge machine which discharges the middle imprint object which passes through the aforementioned electric discharge field by optical irradiation, (A06) (A07) The fixing equipment established in the secondary imprint toner image on the sheet for record which passes through the aforementioned fixing field, the middle imprint object potential regulator which adjusts the potential on a middle imprint object in the aforementioned (A08) potential coordination area.
[Claim 2] While passing through the image formation equipment characterized by having following requirement (B01) - (B09), an electrification (B01) field, a latent-image formation position, a development field, and a primary imprint field one by one and rotating It is charged at the time of the aforementioned electrification field passage, and an electrostatic latent image is formed at the time of latent-image formation position passage. The image support which has the front face in which a toner image is formed at the time of development field passage, the aforementioned (B02) primary imprint field, It is the middle imprint object which passes through a potential coordination area, a secondary imprint field, and an electric discharge field one by one, and rotates. The aforementioned middle imprint object which is a dielectric of high resistance in the state where contain the photoconductivity matter with which resistance falls when light is irradiated, and light is not irradiated, The sheet for record held in the medium tray The aforementioned secondary imprint field, (B03) The sheet transport device conveyed one by one in a fixing field and the sheet eccrisis section, the primary imprint machine which imprints the primary toner image on an image support on a middle imprint object in the aforementioned (B04) primary imprint field, The optical irradiation electric discharge machine which discharges the middle imprint object which passes through the aforementioned electric discharge field by optical irradiation, (B05) The secondary imprint machine which imprints the secondary primary imprint toner

image on a middle imprint object on the aforementioned sheet for record in the aforementioned secondary imprint field, (B06) The fixing equipment established in the secondary imprint toner image on the sheet for record which passes through the aforementioned fixing field, (B07) (B08) Potential regulator control means which perform the aforementioned potential adjustment whenever the middle imprint object potential regulator and the aforementioned (B09) primary imprint which adjust the potential on a middle imprint object in the potential coordination area set up on the moving trucking of the aforementioned middle imprint object are performed.

[Translation done.]

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DETAILED DESCRIPTION

[Detailed Description of the Invention]
[0001]
[The technical field to which invention belongs] this invention relates to the image formation equipment constituted so that the primary toner image especially formed on the image support might be imprinted on a middle imprint object about the image formation equipment which used electrophotography methods, such as a copying machine, facsimile, and a printer, and the secondary primary imprint toner on the aforementioned middle imprint object might be imprinted on the sheet for record.
[0002]
[Description of the Prior Art] Once imprinting the primary toner image (developed image) formed on image supports, such as a photo conductor drum, on middle imprint objects other than an imprint form as the image formation method (the imprint method) in color picture formation equipments, such as an electrophotography copying machine, the method of imprinting the 2nd order to up to an imprint form anew, and obtaining a copy image is learned. And it is known that generating of gap of the poor multiplex imprint by many factors, such as thickness of the maintenance state of an imprint form and an imprint form and the front-face nature of a lumbus and an imprint form, and color registration can be suppressed by using this method. The following conventional technology (J01) is known as image formation equipment which used the aforementioned middle imprint object.
[0003] (J01) technical drawing 8 shown in drawing 8 -- a middle imprint object -- use -- it is explanatory drawing of the image formation equipment of the bottom former Image formation equipment U is equipped with the automatic manuscript transport device U1 and the main part U2 of image formation equipment (copying machine) which has platen glass PG which supports this in drawing 8 . The aforementioned automatic manuscript transport device U1 has the manuscript delivery tray TG2 on which the manuscript Gi with which two or more manuscripts Gi which it is going to copy are conveyed by passing through the copy position on the aforementioned platen glass PG (manuscript reading station) from the manuscript medium tray TG1 laid in piles and the manuscript medium tray TG1 is discharged. The aforementioned main part U2 of image formation equipment has UI (user interface), the exposure optical system A, etc. with which a user does alter operation of the operation command signals, such as a copy start. The reflected light from the manuscript (not shown) placed on platen glass PG with the manuscript or hand control by which platen glass PG conveyance is carried out by the aforementioned automatic manuscript transport device U2 is changed into the electrical signal of R (red), G (green), and B (blue) by CCD (solid state image pickup device) through the aforementioned exposure optical system A. installation performance specification (image-processing system) changes the electrical signal of Above RGB into the image data of K (black), Y (yellow), M (Magenta), and C (cyanogen), memorizes it temporarily, and outputs the aforementioned image data to the laser drive circuit DL to predetermined timing.
[0004] The front face of the image support (photo conductor drum) PR rotated in the arrow Ya direction is uniformly charged with the electrification vessel CR in the electrification field Q0, and passes through the latent-image formation position Q1, the development field Q2, and the primary imprint field Q3 one

by one. ROS (latent-image write-in equipment) driven by the aforementioned laser drive circuit DL carries out an exposure scan in the aforementioned latent-image formation position Q1 by the laser beam L, and forms an electrostatic latent image in an image support PR front face. The electrostatic latent image corresponding to [when forming a full color picture] the picture of four colors of K (black), Y (yellow), M (Magenta), and C (cyanogen) is formed one by one, and when it is a monochrome picture, only the electrostatic latent image corresponding to K (black) picture is formed.

[0005] It rotates and the image support PR front face in which the aforementioned electrostatic latent image was formed passes through the development field Q imprint [2 or primary] field Q3 one by one. The developer G of rotary system has the development counters GK, GY, GM, and GC of four colors of K (black), Y (yellow), M (Magenta), and C (cyanogen) which rotate one by one to the aforementioned development field Q2 with rotation of the axis of rotation GA. The development counters GK, GY, GM, and GC of each aforementioned color have the development roll GR which conveys a developer to the aforementioned development field Q2, and develop the electrostatic latent image on the image support PR which passes through the development field Q2 in the toner image Tn. 2 component developer which has a toner and a carrier as a developer is used, and the toner of negative-electrode electrification nature is used as a toner of yellow, a magenta, cyanogen, and black.

[0006] Under the aforementioned image support PR, the slide frame F1 (it displays by the two-dot chain line) is supported possible [slide movement to order (direction perpendicular to space)] with the slide rails SR and SR of a right-and-left couple. The belt frame F2 of the belt module BM is supported up and down by the slide frame F1 possible [rotation] at the circumference of hinge shaft F2a. The aforementioned belt module BM has two or more belt support rolls (Rd, Rt, Rw, Rf, T2a) supported possible [a rotation of the aforementioned middle imprint belt (belt-like middle imprint object) B], the primary transfer roller T1, and the aforementioned belt frame F2 which supports them. Two or more aforementioned belt support rolls (Rd, Rt, Rw, Rf, T2a) contain the belt driving roll Rd, a tension roll Rt, the walking roll Rw, the idler roll (free roll) Rf, and back-up-roll T2a.

[0007] The imprint voltage of the electrification polarity of a toner and reversed polarity is impressed by the power circuit E which Controller C controls, and the aforementioned primary imprint machine T1 imprints the primary toner image Tn of the aforementioned image support PR front face to the middle imprint belt B in the primary imprint field Q3. In the case of a full color picture, the primary toner image Tn of each color formed in an image support PR front face one by one is imprinted one by one by the middle imprint belt B front face in piles in the aforementioned primary imprint field Q3, and, finally, a full color multiplex toner image is formed on the middle imprint belt B. In forming a monochromatic monochrome color picture, it uses only one development counter, and the primary monochrome toner image is imprinted on the middle imprint belt B. After a primary imprint, a remains toner is cleaned with the image support cleaner CLp, and an image support PR front face is discharged with the image support electric discharge vessel JR.

[0008] The secondary imprint slide frame Fs in which slide movement to order (direction perpendicular to space) is possible is supported removable to the main part of image formation equipment by the lower part of the aforementioned back-up-roll T2a with the slide rails SR and SR of a right-and-left couple. The secondary imprint rise-and-fall frame Ft of the secondary imprint unit Ut supported up and down by the aforementioned secondary imprint slide frame Fs possible [rotation] at the circumference of the hinge shaft Fta can be gone up and down between the evacuation positions which rose and which and descended. [positions] [use] The aforementioned secondary imprint unit Ut has secondary transfer roller T2b, the secondary transfer roller cleaner CL 3 and the roll support lever Lr, the sheet guide SG2 after an imprint, and the sheet conveyance belt BH and the aforementioned secondary imprint rise-and-fall frame Ft which supports them.

[0009] The aforementioned roll support lever Lr is a lever which supports the aforementioned secondary transfer roller T2b. In the state where the aforementioned secondary imprint unit Ut moved to the aforementioned operating position, it rotates to the circumference of the hinge shaft La by the motor which is not illustrated, and the aforementioned roll support lever Lr moves the aforementioned secondary transfer roller T2b between the positions in readiness distant from the secondary imprint

position and the middle imprint belt B in contact with the aforementioned middle imprint belt B. The secondary imprint field Q4 is formed of the surface of action of aforementioned secondary transfer roller T2b and the aforementioned middle imprint belt B, and the secondary imprint machine T2 is constituted by metal electrode roll T2c which contacts aforementioned secondary transfer roller T2b, aforementioned back-up-roll T2a, and back-up-roll T2a.
[0010] To predetermined timing, it is taken out by the pick up roll Rp, and sells, one sheet dissociates at a time with Roll Rs, and record sheet S held in the medium tray TR1 is conveyed by the register roll Rr. Record sheet S conveyed by the aforementioned register roll Rr doubles timing with the multiplex toner image or monochrome toner image imprinted [aforementioned] the 1st order moving to the secondary imprint field Q4, and is conveyed from the sheet guide SG1 before an imprint to the secondary imprint field Q4. In case record sheet S passes through the aforementioned secondary imprint field Q4, secondary imprint voltage of the electrification polarity of a toner and like-pole nature is impressed to electrode roll T2c of the secondary imprint machine T2 from the power circuit E which Controller C controls. The aforementioned secondary imprint machine T2 bundles up the color toner image imprinted in piles by the primary aforementioned middle imprint belt B in the aforementioned secondary imprint field, and imprints it the 2nd order to record sheet S. As for the middle imprint belt B after a secondary imprint, a remains toner is removed by the belt cleaner CLb. Moreover, as for the aforementioned secondary transfer roller T2b, a surface adhesion toner is recovered by the secondary transfer roller cleaner CL 3.
[0011] In addition, aforementioned secondary transfer roller T2b and the belt cleaner CLb are arranged free [a disjunction (isolation and contact)] to the middle imprint belt B, and they are being isolated from the middle imprint belt B until the primary non-established toner image of the last color is imprinted by the middle imprint belt B, when a color picture is formed. The aforementioned record sheet S by which the secondary toner image was imprinted is conveyed to the fixing field Q5 with the after [an imprint] sheet guide SG2, and the sheet conveyance belt BH, and in case it passes through the fixing field Q5, heating fixing of it is carried out by the fixing equipment F which has the fixing roll of the couple constituted by a heating roller Fh and the pressure roll Fp. Record sheet S fixed to the toner image is discharged by the record sheet eccrisis tray TR2. The sheet transport device SH is constituted by the element shown with the aforementioned signs Rp, Rs, Rr, SG1, SG2, and BH.
[0012]
[Problem(s) to be Solved by the Invention] (Trouble of the aforementioned conventional technology (J01)) In the image formation equipment using the middle imprint object of the aforementioned conventional technology (J01), what distributed fillers, such as a carbon metallurgy group compound, as an electric conduction agent in polymeric materials until now is used for the middle imprint object (refer to JP,8-320622,A). However, it is known that there is a close relation to the resistance of a middle imprint object and the quality of image of a toner image which were formed in this way, if resistance is too low, spilling of the toner at the time of an imprint will occur remarkably, and quality of image will deteriorate (refer to JP,08-248779,A). When the resistance of a middle imprint object is too low, since imprint electric field become easy to be built over a field without a toner layer in an operation of the imprint electric field by the primary transfer roller, and imprint current, an imprint field spreads, and it thinks because a toner will scatter and will be imprinted by the operation.
[0013] Moreover, when the resistance of a middle imprint object is high, further, in the case of a dielectric etc., the charge maintenance nature of the middle imprint object in a toner picture field can increase, and electric field required for an imprint can be appropriately impressed to it to a toner. On the other hand, in order that the charge transfer of the middle imprint body surface of the adjoining non-picture section and the interior may decrease, in the primary secondary imprint, the toner imprint to this field stops being able to happen easily. When the resistance of a middle imprint object is high, in the case of a dielectric etc., the toner formation image of quality of image with it is further obtained by this. [there is little spilling of a toner and good] However, since a charge is accumulated on a middle imprint object after a toner imprint in this case, if it remains as it is, a bad influence will be done at the time of the next image formation. Moreover, the following troubles are mentioned though the average resistance

of a middle imprint object suits good resistance width of face. That is, when fillers, such as a carbon metallurgy group compound, are distributed to a macromolecule resin, it is what low resistance-ization of the middle imprint object by dielectric breakdown of the macromolecule resin section between about 1 or more figures, a large thing, and fillers with the very small resistance variation of the middle imprint inside of the body resulting from the distributed state of a filler, the rearrangement of the filler by energization, etc. passes, and happens by the time. Thus, resistance of a middle imprint object separated from partial or resistance width of face good on the whole, and there was a problem of reducing picture quality remarkably.

[0014] Then, we proposed the middle imprint object which has a photoconductivity by Japanese Patent Application No. No. (publication-number - number official report) 123999 [ten to]. Unlike the middle imprint object of resistance, this has the high resistance as a dielectric at the time of the 1st and a secondary imprint, while distributing electric conduction powder, such as conventional carbon black. For this reason, a good picture can be acquired, without electric field spreading at the time of the 1st and a secondary imprint. and the thing done for the optical irradiation of the middle imprint object top after a secondary imprint although a charge is accumulated by imprint electric field on a middle imprint object after the 1st and a secondary imprint, respectively -- non-contact -- and a charge can be discharged, without generating ozone etc.

[0015] Drawing 9 is aforementioned Japanese Patent Application No. No. () 123999 [ten to]. [publication-number -] In drawing showing the toner image in the case of using a photoconductivity middle imprint object of high resistance like a number official report, and imprinting a toner image on a middle imprint object from an image support (photo conductor), and the potential of the circumference Drawing in which drawing 9 A shows the potential on an image support, drawing in which drawing 9 B shows the potential on a middle imprint object, drawing in which drawing 9 B' shows the potential of a middle imprint body surface after the 4th primary imprint, and drawing 9 C are drawings showing secondary imprint electric field. In drawing 9 A and drawing 9 B, the potential distribution which photo conductors also including the toner image which is the imprint purpose had at the time of a primary imprint as an imprint property of this photoconductivity middle imprint object of having high resistance at the time of an imprint is also imprinted on the middle imprint object at the time of a primary imprint. For this reason, the surrounding non-picture section potential is high from the picture section containing the toner image imprinted on the middle imprint object, and a toner image does not have it being restrained and scattering on the outskirts.

[0016] (The 1st trouble) In drawing 9 B', if a primary imprint is performed to the 1st time - the 4th time, an imprint toner image will become large at - side. In drawing 9 C, to the potential difference of the surface potential of a secondary transfer roller, and the picture section, when large, secondary imprint electric field spread [the potential difference of the surface potential (secondary imprint voltage) of a secondary transfer roller, and the non-picture section of a middle imprint object] in the non-picture section, and the imprint electric field of the picture section are falling. That is, in order that, as for imprint electric field, the resistance of a form might spread in the non-picture section with the large potential difference in the high-humidity/temperature lower etc. at the time of the secondary imprint of a low case and a toner might also scatter especially as the 1st problem in the aforementioned photoconductivity middle imprint object, it was difficult for bleeding of a picture to occur and to acquire a good picture.

[0017] (The 2nd trouble) Also in the middle imprint object which contains the photoconductivity matter as the 2nd problem, final toner imprint efficiency is of the same grade as the case where the middle imprint object of the conventional inside resistance is used, and realizing further high imprint efficiency from the structure of a picture, the repeatability of a color, and a viewpoint of a running cost has been called for.

(The 3rd trouble) As the 3rd trouble, since it had the high resistance as a dielectric at the time of a primary imprint, this middle imprint object needed to make primary imprint voltage high one by one henceforth [2nd amorous-glance], when imprinting a toner picture on a middle imprint object over multiple times, such as the time of color picture formation. For this reason, especially, the high voltage

was impressed at the time of the primary imprint of the last color toner, and a power supply with a more big capacity is required, and it had become the factor which raises cost.
[0018] this invention makes a technical problem the following (O01) and the written contents of (O02) in view of the above-mentioned situation (and examination result) in the image formation equipment which used the middle imprint object containing the photoconductivity matter.
(O01) Prevent the breadth to the non-picture section of imprint electric field by making small the potential difference of the picture section at the time of a secondary imprint (portion which imprints a toner), and the non-picture section (the portion which does not imprint a toner, background of a picture).

(O02) When you imprint the primary toner image of a different color on a middle imprint object in piles, enable it to perform a primary imprint good by primary imprint power supplies of a low battery.
[0019]
[Means for Solving the Problem] Next, although this invention thought out in order to solve the aforementioned technical problem is explained, in order to make easy correspondence with the element of the below-mentioned example, what surrounded the sign of the element of an example in the parenthesis is appended to the element of this invention. In addition, the reason for making this invention correspond with the sign of the below-mentioned example, and explaining it is for making an understanding of this invention easy, and is not for limiting the range of this invention to an example.
[0020] In order to solve the above 1st and the 2nd trouble, (The 1st invention) The image formation equipment of the 1st invention While passing through the electrification (A01) field (Q0) characterized by having following requirement (A01) - (A08), a latent-image formation position (Q1), a development field (Q2), and a primary imprint field (Q3) one by one and rotating It is charged at the time of the aforementioned electrification field (Q0) passage, and an electrostatic latent image is formed at the time of latent-image formation position (Q1) passage. The image support which has the front face in which a toner image is formed at the time of development field (Q2) passage (PR), It is the middle imprint object (B) which passes through the aforementioned primary imprint field (Q3), a potential coordination area (Q6), a secondary imprint field (Q4), and an electric discharge field (Q7) one by one, and rotates. (A02) The aforementioned middle imprint object which is a dielectric of high resistance in the state where contain the photoconductivity matter with which resistance falls when light is irradiated, and light is not irradiated (B), The sheet for record (S) held in the medium tray (TR1) The aforementioned secondary imprint field (Q4), (A03) The sheet transport device conveyed one by one in a fixing field (Q5) and the sheet discharge section (SH), The primary imprint machine which imprints the primary toner image on an image support (PR) on a middle imprint object (B) in the aforementioned primary imprint field (Q3) (T1), (A04) The secondary imprint machine which imprints the secondary primary imprint toner image on a middle imprint object (B) on the aforementioned sheet for record (S) in the aforementioned secondary imprint field (Q4) (T2), (A05) The optical irradiation electric discharge machine which discharges the middle imprint object (B) which passes through the aforementioned electric discharge field (Q7) by optical irradiation (JK), (A06) (A07) The fixing equipment (F) established in the secondary imprint toner image on the sheet for record (S) which passes through the aforementioned fixing field (Q5), the middle imprint object potential regulator which adjusts the potential on a middle imprint object (B) in the aforementioned (A08) potential coordination area (Q6) (K).
[0021] (Operation of the 1st invention) With the image formation equipment of the 1st invention equipped with the aforementioned composition The front face of an image support (PR) which passes through an electrification field (Q0), a latent-image formation position (Q1), a development field (Q2), and a primary imprint field (Q3) one by one, and is rotated It is charged at the time of the aforementioned electrification field (Q0) passage, an electrostatic latent image is formed at the time of latent-image formation position (Q1) passage, and a toner image is formed at the time of development field (Q2) passage. The photoconductivity matter with which resistance falls when light is irradiated is contained, and in the state where light is not irradiated, the aforementioned middle imprint object (B) which is a dielectric of high resistance passes through the aforementioned primary imprint field (Q3), a potential coordination area (Q6), a secondary imprint field (Q4), and an electric discharge field (Q7) one

by one, and rotates. A sheet transport device (SH) conveys the sheet for record (S) held in the medium tray (TR1) one by one in the aforementioned secondary imprint field (Q4), a fixing field (Q5), and the sheet discharge section.
[0022] A primary imprint machine (T1) imprints the primary toner image on an image support (PR) on a middle imprint object (B) in the aforementioned primary imprint field (Q3). An optical irradiation electric discharge machine (JK) discharges the middle imprint object (B) which passes through the aforementioned electric discharge field (Q7) by optical irradiation. A secondary imprint machine (T2) imprints the secondary primary imprint toner image on a middle imprint object (B) on the aforementioned sheet for record (S) in the aforementioned secondary imprint field (Q4). Fixing equipment (F) is established in the secondary imprint toner image on the sheet for record (S) which passes through the aforementioned fixing field (Q5). In the aforementioned potential coordination area (Q6), a middle imprint object potential regulator (K) adjusts the potential on a middle imprint object (B).

[0023] While distributing conductive fillers, such as carbon black proposed conventionally, unlike the middle imprint object of resistance, the photoconductivity middle imprint object (B) holds the high resistance as a dielectric at the time of the 1st and a secondary imprint. For this reason, after a primary imprint, a photoconductivity middle imprint body surface will also have the potential distribution which the photo conductor held at the time of image formation like drawing 5 A and drawing 5 B. In the case of reversal development, since the toner picture circumference formed on the middle imprint object (B) is in the state where potential is more high, primary good imprint images are obtained, without scattering imprint toner images on the outskirts.
[0024] However, in the state where the resistance of a form is low, secondary imprint electric field will be in the non-picture section in an extended state (refer to drawing 9 C) especially under high-humidity/temperature, and since a toner is imprinted in the form where the breadth of this electric field is met, it becomes difficult to acquire a good picture. Therefore, it can imprint to the last imprint material, such as paper, without being able to stop the breadth of the imprint electric field at the time of a secondary (refer to drawing 5 C) imprint, and scattering toner pictures by carrying out optical irradiation to a photoconductivity middle imprint object, and making small the surface potential of the non-picture section of a photoconductivity middle imprint object, and the surface potential of the toner picture section after a primary imprint and before a secondary imprint, on it. However, if optical irradiation is carried out so that potential of the non-picture section is made lower than the potential of the picture section in this case, toner layers will be scattered by the electric field from the repulsive force and the non-picture section of the toners charged to like-pole nature, and it will become the picture which scattered on the outskirts.
[0025] Furthermore, a corona discharge phenomenon can be used as an option. In this case, it is the method of leveling near the direct-current-voltage value which superimposes and impresses the voltage of an alternating current and a direct current to corotron, and impresses a middle imprint body surface to corotron. For example, a photo conductor and a middle imprint belt set the direct current voltage impressed to corotron by the case of reversal development by negative electrification nature as the middle potential of the picture section on a middle imprint belt, and the non-picture section. Drawing 6 is explanatory drawing of the mechanism of the potential adjustment at the time of using corotron as a middle imprint object potential regulator. Drawing 6 A the direct current voltage impressed to corotron The picture section on a middle imprint belt, Explanatory drawing in the state where the potential of the picture section at the time of setting it as the middle potential of the non-picture section and the non-picture section changes, Drawing 6 B is drawing showing the potential state of the picture section after drawing and the drawing 6 C potential which show signs that the potential of the picture section and the non-picture section changes change, and the non-picture section, when corotron carries out corona discharge. In drawing 6 , it is charged to near [where the current of a minus component flowed and impressed the direct current voltage impressed to corotron to the picture section with potential lower than the direct-current-voltage value VDC of corotron by setting it as the middle potential of the picture section on a middle imprint belt, and the non-picture section] the direct-current-voltage value VDC.

Moreover, the current of a plus component can lower to the non-picture section with potential higher than the direct-current-voltage value VDC of corotron to near [which was flowed and impressed] the direct-current-voltage value VDC. In this case, the state of drawing 6 B will be in the state of drawing 6 C by the corona discharge by the aforementioned corotron.
[0026] Since the difference of the potential level of the picture section and the non-picture section becomes small by these things, even if it carries out a secondary imprint in the form with which resistance fell under high-humidity/temperature, spilling of the breadth of electric field, i.e., an imprint toner, can be suppressed. Moreover, since the charge is further added to the toner layer of the picture section at this time, imprint electric field become stronger and can improve imprint efficiency. Since a charge falls, by changing to reversed polarity, the fogging toner which is furthermore in the non-picture section can suppress the imprint of a fogging toner.
[0027] In order to solve the 3rd trouble of the above, (The 2nd invention) The image formation equipment of the 2nd invention While passing through the electrification (B01) field (Q0) characterized by having following requirement (B01) - (B09), a latent-image formation position (Q1), a development field (Q2), and a primary imprint field (Q3) one by one and rotating It is charged at the time of the aforementioned electrification field (Q0) passage, and an electrostatic latent image is formed at the time of latent-image formation position (Q1) passage. The image support which has the front face in which a toner image is formed at the time of development field (Q2) passage (PR), It is the middle imprint object (B) which passes through the aforementioned primary imprint field (Q3), a potential coordination area (Q6), a secondary imprint field (Q4), and an electric discharge field (Q7) one by one, and rotates. (B02) The aforementioned middle imprint object which is a dielectric of high resistance in the state where contain the photoconductivity matter with which resistance falls when light is irradiated, and light is not irradiated (B), The sheet for record (S) held in the medium tray (TR1) The aforementioned secondary imprint field (Q4), (B03) The sheet transport device conveyed one by one in a fixing field (Q5) and the sheet discharge section (SH), The primary imprint machine which imprints the primary toner image on an image support (PR) on a middle imprint object (B) in the aforementioned primary imprint field (Q3) (T1), (B04) The optical irradiation electric discharge machine which discharges the middle imprint object (B) which passes through the aforementioned electric discharge field (Q7) by optical irradiation (JK), (B05) The secondary imprint machine which imprints the secondary primary imprint toner image on a middle imprint object (B) on the aforementioned sheet for record (S) in the aforementioned secondary imprint field (Q4) (T2), (B06) The fixing equipment established in the secondary imprint toner image on the sheet for record (S) which passes through the aforementioned fixing field (Q5) (F), (B07) (B08) Potential regulator control means which perform the aforementioned potential adjustment whenever the middle imprint object potential regulator (K) and the aforementioned (B09) primary imprint which adjust the potential on a middle imprint object (B) in the potential coordination area (Q6) set up on the moving trucking of the aforementioned middle imprint object (B) are performed (C7').
[0028] (Operation of the 2nd invention) With the image formation equipment of the 2nd invention equipped with the aforementioned composition The front face of an image support (PR) which passes through an electrification field (Q0), a latent-image formation position (Q1), a development field (Q2), and a primary imprint field (Q3) one by one, and is rotated It is charged at the time of the aforementioned electrification field (Q0) passage, an electrostatic latent image is formed at the time of latent-image formation position (Q1) passage, and a toner image is formed at the time of development field (Q2) passage. The photoconductivity matter with which resistance falls when light is irradiated is contained, and in the state where light is not irradiated, the middle imprint object (B) which is a dielectric of high resistance passes through the aforementioned primary imprint field (Q3), a potential coordination area (Q6), a secondary imprint field (Q4), and an electric discharge field (Q7) one by one, and rotates. A sheet transport device (SH) conveys the sheet for record (S) held in the medium tray (TR1) one by one in the aforementioned secondary imprint field (Q4), a fixing field (Q5), and the sheet discharge section.
[0029] A primary imprint machine (T1) imprints the primary toner image on an image support (PR) on a middle imprint object (B) in the aforementioned primary imprint field (Q3). An optical irradiation

electric discharge machine (JK) discharges the middle imprint object (B) which passes through the aforementioned electric discharge field (Q7) by optical irradiation. In the aforementioned secondary imprint field (Q4), a secondary imprint machine (T2) imprints the secondary primary imprint toner image on a middle imprint object (B) on the aforementioned sheet for record (S). Fixing equipment (F) is established in the secondary imprint toner image on the sheet for record (S) which passes through the aforementioned fixing field (Q5).
[0030] In the potential coordination area (Q6) set up on the moving trucking of the aforementioned middle imprint object (B), a middle imprint object potential regulator (K) adjusts the potential on a middle imprint object (B). Potential regulator control means (C7') perform the aforementioned potential adjustment, whenever the aforementioned primary imprint is performed. Optical irradiation or corona discharge can perform the aforementioned potential adjustment.
[0031] That is, the photo conductor potential distribution at the time of the image formation imprinted by the middle imprint object (B) can be adjusted by carrying out optical irradiation on a middle imprint object (B) after the aforementioned primary imprint. Potential level at this time is carried out to more than the level that united the potential of the middle imprint body surface of the picture section, and the toner image potential currently formed on it. If potential of the non-picture section is made low like the time of a secondary imprint also in this case, a toner image will scatter on the outskirts. By lowering the middle imprint object potential level under primary imprint, even when imprinting the toner image after 2 amorous glance, it can prevent that primary imprint voltage rises greatly. When potential adjustment of the middle imprint body surface is carried out also including a toner layer by the electric discharge phenomenon by corotron etc., it can prevent that can lower the potential as the whole middle imprint object (B) similarly, and primary imprint voltage rises greatly. In addition, the potential of the picture section on a middle imprint object (B) and the non-picture section changes by setup of the primary secondary imprint, and should just also set up the potential adjusted by corotron etc. if needed at any time.
[0032]
[The form of operation] (Form 1 of operation) The form 1 of operation of the image formation equipment of this invention is the aforementioned middle imprint object potential regulator which is characterized by having the following requirements (AB01) in the above 1st or the 2nd invention and which was constituted by the middle (AB01) imprint object (B) with the optical irradiation vessel which irradiates light (K).
[0033] (Operation of the form 1 of operation) The aforementioned middle imprint object potential regulator (K) is constituted from a form 1 of the operation of the image formation equipment of this invention which offered the aforementioned composition by the middle imprint object (B) with the optical irradiation vessel which irradiates light. The aforementioned middle imprint object (B) containing the photoconductivity matter can adjust the potential of a twist to optical irradiation.
[0034] (Form 2 of operation) The form 2 of operation of the image formation equipment of this invention is the aforementioned middle imprint object potential regulator which is characterized by having the following requirements (AB02) in the above 1st or the 2nd invention and which was constituted with the corona discharge (AB02) vessel (K).
[0035] (Operation of the form 2 of operation) The aforementioned middle imprint object potential regulator (K) is constituted from the form 2 of the operation of the image formation equipment of this invention which offered the aforementioned composition by the corona discharge machine. The aforementioned middle imprint object (B) can adjust potential with a corona discharge vessel.
[0036] (Example) Although the example (example) of the form of operation of this invention is explained referring to a drawing next, this invention is not limited to the following examples.
[0037] (Example 1) Drawing 1 is the whole image formation equipment explanatory drawing of the example 1 of this invention. In explanation of the image formation equipment U of this example 1 shown in drawing 1 , to the same component as the component of the conventional image formation equipment shown in aforementioned drawing 8 , the same sign as the sign used by aforementioned drawing 8 is given, and the detailed explanation is omitted to it. the conventional image formation

equipment which showed the example 1 of the image formation equipment of this invention shown in drawing 1 to aforementioned drawing 8 , and abbreviation -- although constituted identically, it is different in respect of the following

[0038] The middle imprint object potential regulator K constituted by Red Light Emitting Diode (optical irradiation machine) is arranged at the potential coordination area Q6 set as the conveyance direction upstream of the middle imprint belt B of the secondary imprint field Q4 of the image formation equipment shown in aforementioned drawing 1 . On both sides of the middle imprint belt B, the ground roll (grounded roll) Re is arranged in the aforementioned middle imprint object potential regulator K and the position which counters. The potential of the middle imprint belt B is adjusted by the optical irradiation by the aforementioned middle imprint object potential regulator K. In the middle imprint object electric discharge field Q7 set as the conveyance direction downstream of the middle imprint belt B of the secondary imprint field Q4 of the image formation equipment shown in aforementioned drawing 1 , the optical irradiation electric discharge machine JK constituted by Red Light Emitting Diode (optical irradiation machine) is arranged. On both sides of the middle imprint belt B, the aforementioned optical irradiation electric discharge machine JK and the idler roll Re grounded to the position which counters are arranged. The middle imprint belt B is discharged in the middle imprint object electric discharge field Q7 by the optical irradiation with the aforementioned optical irradiation electric discharge machine JK. The voltage impressed to the aforementioned middle imprint object potential regulator K and the optical irradiation electric discharge machine JK is supplied from a power circuit E (not shown [refer to drawing 1 and wiring]).

[0039] (Secondary imprint machine T2) between the contiguity positions distant from the aforementioned back-up-roll T2a and this back-up-roll T2a which and are pressed -- a disjunction -- being possible (isolation and approach being possible) -- the secondary imprint machine T2 is constituted by arranged secondary transfer roller T2b and metal electrode roll T2c which contacts the aforementioned back-up-roll T2a [positions] [isolation] The aforementioned back-up-roll T2a twists the elastic body of half-conductivity around a conductive metal roll, and is constituted, for example, the surface resistivity is adjusted 1x107ohms / more than **. Moreover, secondary transfer roller T2b by which the ground was carried out [aforementioned] wraps the front face of a metal roll in carbon part scattering gun urethane, and the clothing of the outside is carried out with the thin layer film of half-conductivity, for example, the volume resistivity is adjusted to 109-ohmcm.

[0040] ((B) Middle imprint belt) Drawing 2 is drawing showing the composition of the middle imprint belt currently used in the example 1 of the image formation equipment of this invention. The middle imprint belt (belt-like middle imprint object) B currently used in the example 1 of the aforementioned image formation equipment is constituted as follows. In drawing 2 , the aforementioned middle imprint belts B are four layer structures, and the laminating of the belt base material B1, blocking layer B-2a, charge generating layer B-2b, and the charge transporting-bed B-2c is carried out one by one toward the front-face side from the rear face. In addition, photoconduction layer B-2 is constituted by aforementioned charge generating layer B-2b and charge transporting-bed B-2c.

(Belt base material B1) It is constituted by the polyimide resin which added the carbon black 15% of the weight, and is formed in 75 micrometers of thickness. A volume resistivity is set as 109.5-ohmcm and surface electrical resistance is set as 1012ohms / **.

[0041] (Blocking layer B-2a) a blocking layer (B-2a) -- for example, it can form as follows Acetylacetone zirconium butoxide (ORUGACHIKKUSU ZC540, the Matsumoto intersection trading company make) 20 weight sections gamma-aminopropyl triethoxysilane 2 weight sections polyvinyl butyral resin (S REKKU BM-S, Sekisui Chemical Co., Ltd. make)

1.5 weight section n-butyl alcohol After applying to a base-material (B1) front face, it is made to dry, for example, the solution which consists of the 70 weight sections above-mentioned component is formed in 0.9 micrometers. The aforementioned blocking layer (B-2a) - (minus) Although the electron transfer which is a polar carrier allows, movement of the hole which is + (plus) polarity carrier has the function to prevent.

[0042] (Charge generating layer B-2b) It is the layer of 0.25 micrometers of thickness formed of PVK

(Poly vinyl carbazole, polyvinyl-carbazole) which added the phthalocyanine-pigment system charge generating agent. If light is irradiated, the charge of + (plus) and - (minus) will be generated.
[0043] (Charge transporting-bed (hole transporting bed) B-2c) It is constituted by the polycarbonate resin which added the triphenylamine system charge transportation agent, and is 25 micrometers of thickness. + (Plus) Although movement of the hole which is a polar carrier is allowed, the electron transfer which is - (minus) polarity carrier has the function to prevent. That is, charge transporting-bed B-2c of this example 1 is a hole transporting bed.
[0044] (Explanation of the control section of an example 1) Drawing 3 is the block diagram of the control section of the aforementioned example 1. UI (user interface) is connected to the aforementioned controller C, and UI has the copy start key (job start key) UIa, the full color mode selection key UIb, the ten key UIc, Drop UId, etc. The detecting signal of the following sensor is inputted into the aforementioned controller C.
SNB: The belt position sensor belt position sensor SNB (refer to drawing 1 and drawing 3) detects the mark (mark) attached to the middle imprint belt B, and outputs a detecting signal to the aforementioned controller C.
SN1: SHITOSAIZUSENSA SHITOSAIZUSENSA SN1 is a sensor of a detection sake about the existence and the paper size (sheet size) of sheet (form) passage, and outputs a detecting signal to the aforementioned controller C. In addition, the detecting signal of the delivery sensor which is not illustrated, a fixing equipment temperature sensor, and other sensors is inputted into the aforementioned controller C.
[0045] Above UI (user interface), the various aforementioned sensors SNB and SN1, and the aforementioned controller C into which the signal from -- is inputted The operation timing-control signal of Above installation performance specification, the operation timing-control signal of the laser driving-signal output unit DL, The operation control signal of the power circuit E2 for the power circuit E imprint [1 or secondary] for the primary imprint of the belt driving circuit D and power circuit E which drive the belt driving motor M for carrying out the rotation drive of the middle imprint belt B, the power supply E3 for middle imprint object potential adjustment, and electric discharge dexterous power circuit E4 grade is outputted. According to the control signal which the aforementioned controller C outputs, the power supply E3 for middle imprint object potential adjustment drives the aforementioned middle imprint object potential regulator K, and the electric discharge dexterous power circuit E4 drives the optical irradiation electric discharge machine JK.
[0046] The aforementioned controller C which performs processing according to the aforementioned various input signals I/O which performs I/O of a signal with the exterior, regulation of I/O signal level, etc. (input/output interface), ROM a program, data, etc. for performing required processing were remembered to be (read only memory), RAM for memorizing required data temporarily (RAM), It is constituted by the row by computer which has CPU (arithmetic and program control) which performs input/output control, data processing, etc. according to the program memorized by Above ROM, and various functions can be realized by executing the program memorized by Above ROM. That is, Controller C has the following function.
[0047] C1: The belt position detection means belt position detection means C1 has detected the rotation position of the middle imprint belt B, when the aforementioned belt position sensor SNB measures the elapsed time from the time which detected the aforementioned belt mark MK.
C2: The sheet size detection means sheet size detection means C2 detects the sheet size of the sheet (form) conveyance direction by the passage time of the sheet (form) nose of cam and the back end which the aforementioned sheet size sensor SN1 detects.
[0048] C3: The notice signal output means C3 of notice signal output means of write-in timing write-in timing is outputting the notice signal of write-in timing to Above installation performance specification and the laser driving-signal output unit DL based on the belt mark detection signal of the aforementioned belt position sensor SNB. That is, since the toner image imprint starting position on the middle imprint belt B arrives at the aforementioned primary imprint field Q3 after a predetermined time, it is necessary to make the front end of the toner image which doubles timing with it and is formed on

the image support PR arrive at the aforementioned primary imprint position Q3, after the aforementioned belt position sensor SNB detects a belt mark. For that purpose, it is necessary to start the picture writing to the latent-image formation position Q1 by Above ROS to predetermined timing. For this reason, the notice signal output means C3 of write-in timing is outputting the aforementioned notice signal of write-in timing. In addition, Above installation performance specification and the laser driving-signal output unit DL output a laser driving signal to ROS from the laser driving-signal output unit DL to predetermined timing, after the aforementioned notice signal of write-in timing is outputted.
[0049] C4: Belt control-means belt control means output the control signal of the belt driving circuit D of the belt driving motor M by which C4 carries out the rotation drive of the aforementioned middle imprint belt B.
Primary C 5:1st imprint machine control-means imprint machine control means C5 impress fixed primary imprint current or fixed voltage to the primary imprint machine T1, in case the image formation field of the middle imprint belt B passes through the primary imprint field Q3.
In case the image formation field of the middle imprint belt B passes through the secondary imprint field Q3, secondary C 6:2nd imprint machine control-means imprint machine control means C6 impress fixed secondary imprint current or fixed voltage to the secondary imprint machine T2 in order to perform a secondary imprint.
[0050] C7: The potential regulator control-means potential regulator control means C7 output the lighting control signal of the middle imprint object potential regulator (red Light Emitting Diode) K which adjusts the potential of the middle imprint belt B front face which passes the potential coordination area Q6 of secondary imprint field Q4 upstream of the middle imprint belt B.
[0051] C8: In case the portion into which the secondary imprint of the middle imprint belt B was performed passes through the electric discharge field Q7, the electric discharge machine lighting control-means electric discharge machine lighting control means C8 output an electric discharge machine lighting control signal to the aforementioned electric discharge dexterous power circuit E4 (refer to drawing 3) so that the aforementioned optical irradiation electric discharge machine JK may be turned on.
[0052] The light source control circuit (C+E4) is constituted by Controller C and the electric discharge dexterous power circuit E4 which have the aforementioned electric discharge machine lighting control means C7. The resistivity control unit (C+E4+JK) is constituted by Controller C and the electric discharge dexterous power circuit E4 which have the aforementioned electric discharge machine lighting control means C7, and the optical irradiation electric discharge machine JK.
[0053] (Operation timing of the potential regulator K and the optical irradiation electric discharge machine JK) Drawing 4 is the timing diagram of the primary imprint machine T1 of an example 1, the middle imprint object potential regulator K, the secondary imprint machine T2, and the optical irradiation electric discharge machine JK. In drawing 4 , the middle imprint object potential regulator K of the image formation equipment of this example 1 is controlled to perform potential adjustment of the photoconductivity middle imprint object by optical irradiation before a secondary imprint after the primary imprint end of multiple times (after the primary imprint end of the last imprint toner image in the toner image of four colors). Moreover, the aforementioned optical irradiation electric discharge machine JK is controlled to discharge the middle imprint belt B by optical irradiation after a secondary imprint end.
[0054] (Operation of an example 1) Next, the image formation equipment of this example 1 is used, and the operation at the time of performing image formation operation under high-humidity/temperature (28 degrees C, 85%) is explained.
(Form) The form was kept under high-humidity/temperature (28 degrees C, 85%) for 12 hours, and was changed into the state where resistance fell enough. Volume resistivity of the form at this time When measured in Kethly 487 Picoammeter and 8009 Resistiolity test fixture, it was 4.58x108 ohm-cm.
[0055] (Primary imprint voltage) Table 1 is a table showing required primary transfer roller direct-current applied voltage and primary transfer roller direct-current applied voltage required in with exposure of the below-mentioned examples 3 and 4, when you have no exposure after the primary

imprint of examples 1 and 2.
[Table 1]
(表１)　１次転写ロール直流印加電圧

	１次転写後の露光	
	無	有
１次転写 1cycle 後	380V	380V
１次転写 2cycle 後	480V	410V
１次転写 3cycle 後	650V	460V
１次転写 4cycle 後	800V	490V

１次転写電流：６μＡ

As shown in Table 1, in order to 6microA Pass primary imprint current, voltage higher than a case with the exposure after a primary imprint (the below-mentioned example 3, four references) is required for the right voltage (voltage in the case of having no exposure) impressed to the primary transfer roller T1 of an example 1.
[0056] Table 2 is a table showing primary imprint voltage and middle imprint body surface potential in the case (when you have no adjustment of the potential regulator K) of having no exposure after the primary imprint of examples 1 and 2, and primary imprint voltage required in with exposure of the below-mentioned example 3 and middle imprint body surface potential.
[Table 2]
(表２) 光導伝性中間転写体の表面電位と一次転写電圧

	１次転写後の露光無し		１次転写後の露光有り	
	中間転写体表面電位	１次転写電圧	中間転写体表面電位	１次転写電圧
１次転写 1cycle 後	-125V	380V	-90V	380V
１次転写 2cycle 後	-300V	480V	-185V	410V
１次転写 3cycle 後	-450V	650V	-260V	460V
１次転写 4cycle 後	-625V	800V	-350V	490V
２次転写前露光後	-400V	—	—	—
２次転写後	-110V	—	-80V	—
２次転写後露光後	-20V	—	-15V	—

[0057] The primary transfer roller direct-current applied voltage when impressing the right voltage of the constant current control of 6microA to the aforementioned primary transfer roller T1, and changing applied voltage from one amorous glance one by one up to four amorous glance is as being shown in the aforementioned table 1, and the non-picture section potential of a middle imprint body surface is as follows (refer to Table 2).
After 1 amorous-glance imprint: It is :-625V after :-300V and 3 amorous-glance imprint after -125V and 2 amorous-glance imprint at the time of :-450V and 4 amorous-glance imprint.
[0058] The non-picture section potential after exposure when the middle imprint object potential regulator K which is after the primary imprint of four amorous glance, and was constituted by Red Light Emitting Diode before the secondary imprint performs potential adjustment of a middle imprint body surface (after potential adjustment) was -400V. It is drawing showing the toner image in the case of drawing 5 using the photoconductivity middle imprint object B of high resistance of an example 1 (middle imprint belt), and imprinting a toner image on the middle imprint object B from the image support (photo conductor) PR, and the potential of the circumference. Drawing showing that potential (-potential) rises whenever it repeats a primary imprint in drawing in which drawing 5 A shows the potential on the image support PR, and drawing in which drawing 5 B shows the potential on the middle

imprint object B, Since the difference of the picture potential of a middle imprint object B front face and non-picture potential became small, drawing and drawing 5 C which shows that the potential of a middle imprint body surface falls by exposing drawing 5 B' after the 4th primary imprint is drawing showing the state where the breadth to the non-picture section of secondary imprint electric field was lost. In the state of drawing 5 C, since the breadth to the non-picture section of secondary imprint electric field was lost as compared with the aforementioned drawing 9 C, spilling of a toner etc. decreases.
(Secondary imprint voltage) In this example 1, it imprinted in the state of the aforementioned drawing 5 C by impressing the constant voltage of 1000V to secondary transfer roller T2b.
[0059] (Picture pattern) Two kinds were prepared for the picture pattern of a print sample, the 1st sheet considered as solid and the thing which made the set the kanji with which the sizes by black toner monochrome differ of 2cm angle size of yellow, a magenta, cyanogen, **** monochrome, a secondary color, and the 3rd color, and the 2nd sheet made it the 400 line(s)/inch halftone picture of black toner monochrome, and it outputted two sorts of samples by turns Although the middle imprint body surface potential of an immediately after [the secondary imprint of the print of the 1st sheet] had the surface potential nonuniformity according to the about [-100V] picture pattern from -70V After the optical irradiation with the optical irradiation electric discharge machine JK, it became almost uniform [the surface potential of a middle imprint object] from -10V to -30V, and the uniform picture which has neither concentration nonuniformity nor spilling also in the 400 line(s)/inch halftone picture which is the following print sample was acquired. Although a total of two sorts of 20000 print samples was outputted by turns, the good picture in which concentration nonuniformity, spilling, and a picture grow fat and which is not was acquired.
[0060] (Example 2) The example 2 of the image formation equipment of this invention is constituted like the aforementioned example 1 in respect of others, although it is different from the image formation equipment of the aforementioned example 1 the following point. The point which used the middle imprint object potential regulator K constituted from this example 2 by SUKOTORON to having used the middle imprint object potential regulator K which consisted of aforementioned examples 1 with the optical irradiation vessel. The operation timing of the middle imprint object potential regulator K of the image formation equipment of this example 2 and the optical irradiation electric discharge machine JK is the same as that of the aforementioned example 1. That is, the timing chart is the same as that of aforementioned drawing 4 . That is, the middle imprint object potential regulator K is controlled to perform potential adjustment of the photoconductivity middle imprint object by optical irradiation before a secondary imprint after the primary imprint end of multiple times (after the primary imprint end of the last imprint toner image in the toner image of four colors). Moreover, the optical irradiation electric discharge machine JK is controlled so that after a secondary imprint end discharges electricity.
[0061] (Operation of an example 2) Next, the image formation equipment of this example 2 is used, and the operation at the time of performing image formation operation under high-humidity/temperature (28 degrees C, 85%) is explained.
(Form) The form used the same form as the aforementioned example 1.
(Primary imprint voltage) The right voltage of the constant current control of 6microA is impressed to the primary transfer roller T1, and it enabled it to change applied voltage from one amorous glance one by one up to four amorous glance. The non-picture section potential of the middle imprint body surface at this time was as follows.
After 1 amorous-glance imprint: It is :-625V after :-300V and 3 amorous-glance imprint after -125V and 2 amorous-glance imprint at the time of :-450V and 4 amorous-glance imprint.
[0062] The non-picture section potential after exposure when the middle imprint object potential regulator K which is after the primary imprint of four amorous glance, and was constituted by scorotron before the secondary imprint performs potential adjustment of a middle imprint body surface (after potential adjustment) was -400V.
(Secondary imprint voltage) It imprinted by impressing the constant voltage of 1000V to secondary transfer roller T2b.
[0063] (Picture pattern) Two kinds were prepared for the picture pattern of a print sample, the 1st sheet

considered as solid and the thing which made the set the kanji with which the sizes by black toner monochrome differ of 2cm angle size of yellow, a magenta, cyanogen, **** monochrome, a secondary color, and the 3rd color, and the 2nd sheet made it the 400 line(s)/inch halftone picture of black toner monochrome, and it outputted two sorts of samples by turns Although the middle imprint body surface potential of an immediately after [the secondary imprint of the print of the 1st sheet] had the surface potential nonuniformity according to the about [-100V] picture pattern from -70V After the potential adjustment with the optical irradiation electric discharge machine JK, it became almost uniform [the surface potential of a middle imprint object] from -10V to -30V, and the uniform picture which has neither concentration nonuniformity nor spilling also in the 400 line(s)/inch halftone picture which is the following print sample was acquired. Although a total of two sorts of 20000 print samples was outputted by turns, the good picture in which concentration nonuniformity, spilling, and a picture grow fat and which is not was acquired.

[0064] (Example 3) The example 3 of the image formation equipment of this invention is constituted like the aforementioned example 1 in respect of others, although it is different from the image formation equipment of the aforementioned example 1 the following point. With the image formation equipment of this example 3, the operation timing of the middle imprint object potential regulator K is different from the aforementioned example 1. Drawing 7 is the timing diagram of the primary imprint machine T1 of an example 3, the middle imprint object potential regulator K, the secondary imprint machine T2, and the optical irradiation electric discharge machine JK. As opposed to the middle imprint object potential regulator K of the aforementioned example 1 having been controlled to perform potential adjustment of the photoconductivity middle imprint object by optical irradiation before a secondary imprint after the primary imprint end of multiple times (after the primary imprint end of the last imprint toner image in the toner image of four colors) The middle imprint object potential regulator K of this example 3 is controlled for every primary imprint end to perform potential adjustment of the photoconductivity middle imprint object by optical irradiation to be shown in drawing 7 . Control of the aforementioned middle imprint object potential regulator K is performed by potential regulator control-means C7' of the controller C of an example 3.

[0065] (Operation of an example 3) Next, the image formation equipment of this example 3 is used, and the operation at the time of performing image formation operation under high-humidity/temperature (28 degrees C, 85%) is explained.

(Form) The form used the same form as the aforementioned example 1.

(Primary imprint voltage) The right voltage of the constant current control of 6microA is impressed to the primary transfer roller T1, and it enabled it to change applied voltage from one amorous glance one by one up to four amorous glance. At this time, optical irradiation by the middle imprint object potential regulator K (red Light Emitting Diode) was performed for after [every] the primary imprint of the toner of each color, and middle imprint body surface potential was adjusted at any time. The non-picture section potential of the middle imprint body surface at this time was as follows.

After 1 amorous-glance imprint: It is :-350V after :-185V and 3 amorous-glance imprint after -90V and 2 amorous-glance imprint at the time of :-260V and 4 amorous-glance imprint.

[0066] When the aforementioned table 1 has the primary transfer roller direct-current applied voltage in with the exposure after the primary imprint of an example 3, and no exposure for comparison, required primary transfer roller direct-current applied voltage is shown. . As shown in the aforementioned table 1, the right voltage impressed to the primary transfer roller T1 is voltage lower than the case where it does not expose after a primary imprint.

[0067] Primary imprint voltage in with (in the case of with adjustment of the potential regulator K) the exposure after the primary imprint of an example 3 and middle imprint body surface potential, and primary imprint voltage required when you have no exposure for comparison and middle imprint body surface potential are shown in the aforementioned table 2.

[0068] (Secondary imprint voltage) It imprinted by impressing the constant voltage of 1000V to secondary transfer roller T2b.

[0069] (Picture pattern) Two kinds were prepared for the picture pattern of a print sample, the 1st sheet

considered as solid and the thing which made the set the kanji with which the sizes by black toner monochrome differ of 2cm angle size of yellow, a magenta, cyanogen, **** monochrome, a secondary color, and the 3rd color, and the 2nd sheet made it the 400 line(s)/inch halftone picture of black toner monochrome, and it outputted two sorts of samples by turns Although the middle imprint body surface potential of an immediately after [the secondary imprint of the print of the 1st sheet] had the surface potential nonuniformity according to the about [-80V] picture pattern from -60V After the optical irradiation with the optical irradiation electric discharge machine JK, it became almost uniform [the surface potential of a middle imprint object] from -10V to -30V, and the uniform picture which has neither concentration nonuniformity nor spilling also in the 400 line(s)/inch halftone picture which is the following print sample was acquired. Although a total of two sorts of 20000 print samples was outputted by turns, the good picture in which concentration nonuniformity, spilling, and a picture grow fat and which is not was acquired.

[0070] (Example 4) The example 4 of the image formation equipment of this invention is constituted like the aforementioned example 1 in respect of others, although it is different from the image formation equipment of the aforementioned example 1 the following point. By this example 4, the middle imprint object potential regulator K constituted by SUKOTORON is used to having used the middle imprint object potential regulator K which consisted of aforementioned examples 1 with the optical irradiation vessel. Moreover, with the image formation equipment of this example 4, the operation timing of the middle imprint object potential regulator K is different from the aforementioned example 1. Namely, the middle imprint object potential regulator K of the aforementioned example 1 As opposed to having been controlled to perform potential adjustment of the photoconductivity middle imprint object by optical irradiation before a secondary imprint after the primary imprint end of multiple times (after the primary imprint end of the last imprint toner image in the toner image of four colors) For every primary imprint end, the middle imprint object potential regulator K of this example 4 is controlled so that the corona discharge (a direct current and alternating voltage are superimposed) of scorotron performs potential adjustment of a photoconductivity middle imprint object. Therefore, the timing diagram of an example 4 is the same as that of the timing diagram (refer to drawing 7) of the aforementioned example 3.

[0071] (Operation of an example 4) Next, the image formation equipment of this example 4 is used, and the operation at the time of performing image formation operation under high-humidity/temperature (28 degrees C, 85%) is explained.

(Form) The form used the same form as the aforementioned example 1.

(Primary imprint voltage) The right voltage of the constant current control of 6microA is impressed to the primary transfer roller T1, and it enabled it to change applied voltage from one amorous glance one by one up to four amorous glance. At this time, corona discharge by the middle imprint object potential regulator (scorotron) K was performed for after [every] the primary imprint of the toner of each color, and middle imprint body surface potential was adjusted. The direct current voltage impressed to the middle imprint object potential regulator K at this time (scorotron) was as follows.

After 1 amorous-glance imprint: It is :-330V after :-175V and 3 amorous-glance imprint after -90V and 2 amorous-glance imprint at the time of :-240V and 4 amorous-glance imprint.

[0072] In this case, the non-picture section potential of the middle imprint body surface after the potential adjustment by the middle imprint object potential regulator (scorotron) K was as follows.

After 1 amorous-glance imprint: It is :-360V after :-195V and 3 amorous-glance imprint after -100V and 2 amorous-glance imprint at the time of :-270V and 4 amorous-glance imprint.

[0073] (Secondary imprint voltage) It imprinted by impressing the constant voltage of 1000V to secondary transfer roller T2b.

[0074] (Picture pattern) Two kinds were prepared for the picture pattern of a print sample, the 1st sheet considered as solid and the thing which made the set the kanji with which the sizes by black toner monochrome differ of 2cm angle size of yellow, a magenta, cyanogen, **** monochrome, a secondary color, and the 3rd color, and the 2nd sheet made it the 400 line(s)/inch halftone picture of black toner monochrome, and it outputted two sorts of samples by turns Although the middle imprint body surface potential of an immediately after [the secondary imprint of the print of the 1st sheet] had the surface

potential nonuniformity according to the about [-80V] picture pattern from -60V After the optical irradiation with the optical irradiation electric discharge machine JK, it became almost uniform [the surface potential of a middle imprint object] from -10V to -30V, and the uniform picture which has neither concentration nonuniformity nor spilling also in the 400 line(s)/inch halftone picture which is the following print sample was acquired. Although a total of two sorts of 20000 print samples was outputted by turns, the good picture in which concentration nonuniformity, spilling, and a picture grow fat and which is not was acquired.

[0075] (Example of comparison) Operation of image formation equipment which does not form the middle imprint object potential regulator K as an example of comparison is explained.

(Operation of the example of comparison) Next, the image formation equipment of the aforementioned example of comparison is used, and the operation at the time of performing image formation operation under high-humidity/temperature (28 degrees C, 85%) is explained.

(Form) The form used the same form as the aforementioned example 1.

(Primary imprint voltage) The right voltage of the constant current control of 6microA is impressed to the primary transfer roller T1, and it enabled it to change applied voltage from one amorous glance one by one up to four amorous glance. At this time, the middle imprint body surface potential after the primary imprint of the toner of each color was as follows.

After 1 amorous-glance imprint: It is :-625V after :-300V and 3 amorous-glance imprint after -125V and 2 amorous-glance imprint at the time of :-450V and 4 amorous-glance imprint.

[0076] (Secondary imprint voltage) It imprinted by impressing the constant voltage of 1000V to secondary transfer roller T2b.

[0077] (Picture pattern) Two kinds were prepared for the picture pattern of a print sample, the 1st sheet considered as solid and the thing which made the set the kanji with which the sizes by black toner monochrome differ of 2cm angle size of yellow, a magenta, cyanogen, **** monochrome, a secondary color, and the 3rd color, and the 2nd sheet made it the 400 line(s)/inch halftone picture of black toner monochrome, and it outputted two sorts of samples by turns Although the middle imprint body surface potential of an immediately after [the secondary imprint of the print of the 1st sheet] had the surface potential nonuniformity according to the about [-110V] picture pattern from -80V After the optical irradiation with the optical irradiation electric discharge machine JK, the surface potential of a middle imprint object becomes almost uniform from -10V to -30V. In the 400 line(s)/inch halftone picture which is the following print sample, it became the picture which the concentration nonuniformity considered to be based on the form resistance fall under high-humidity/temperature and the bias of imprint electric field and spilling have generated.

[0078] (Example of change) Although the example of this invention was explained in full detail above, this invention can make various change within the limits of the summary of this invention which is not limited to the aforementioned example and indicated by the claim. The change example of this invention is illustrated below.

(H01) The middle imprint object used by this invention is usable also with the image formation equipment of the tandem type equipped with two or more image supports.

(H02) The secondary imprint machine T2 can be constituted with the contact roll which contacts back-up-roll T2a, secondary transfer roller T2b, and the aforementioned back-up-roll T2a.

(H03) Although the example using the middle imprint object of four layer structures which carried out film formation was shown at the order of a ground layer, a charge generating layer, and a charge transporting bed on the lowest layer front face which distributed carbon black in the aforementioned example Even when only the monolayer which has a photoconductivity for a middle imprint object is made two-layer [in_which the photoconduction layer was formed on the ground layer front face which distributed carbon black etc.], in the same operation, it is stabilized and good quality of image can be obtained.

(H04) Although potential adjustment of the middle imprint object by optical irradiation of the aforementioned example is performed from the middle imprint body surface side, when a photoconductivity middle imprint object is a monolayer, or when the lowest layer is permeability also in

a double layer, it is possible to perform optical irradiation from a rear face.
[0079]
[Effect of the Invention] The image formation equipment of the above-mentioned this invention can do the following effect so.
(E01) By making small the potential difference of the picture section at the time of a secondary imprint (portion which imprints a toner), and the non-picture section (the portion which does not imprint a toner, background of a picture), the breadth to the non-picture section of imprint electric field can be prevented. Therefore, it can imprint with a good picture, without a toner picture scattering, even when form resistance, such as the bottom of high-humidity/temperature, falls.
(E02) The primary imprint of multiple times can be performed continuously, without primary imprint voltage impressed also in the photoconductivity middle imprint object which has the high resistance as a dielectric at the time of a primary imprint rising greatly. Therefore, when imprinting the primary toner image of a different color on a middle imprint object in piles, primary imprint power supplies of a low battery can perform a primary imprint good.

[Translation done.]

* NOTICES *

1.This document has been translated by computer. So the translation may not reflect the original precisely.
2.**** shows the word which can not be translated.
3.In the drawings, any words are not translated.

PRIOR ART

[Description of the Prior Art] Once imprinting the primary toner image (developed image) formed on image supports, such as a photo conductor drum, on middle imprint objects other than an imprint form as the image formation method (the imprint method) in color picture formation equipments, such as an electrophotography copying machine, the method of imprinting the 2nd order to up to an imprint form anew, and obtaining a copy image is learned. And it is known that generating of gap of the poor multiplex imprint by many factors, such as thickness of the maintenance state of an imprint form and an imprint form and the front-face nature of a lumbus and an imprint form, and color registration can be suppressed by using this method. The following conventional technology (J01) is known as image formation equipment which used the aforementioned middle imprint object.
[0003] (J01) technical drawing 8 shown in drawing 8 -- a middle imprint object -- use -- it is explanatory drawing of the image formation equipment of the bottom former Image formation equipment U is equipped with the automatic manuscript transport device U1 and the main part U2 of image formation equipment (copying machine) which has platen glass PG which supports this in drawing 8 . The aforementioned automatic manuscript transport device U1 has the manuscript delivery tray TG2 on which the manuscript Gi with which two or more manuscripts Gi which it is going to copy are conveyed by passing through the copy position on the aforementioned platen glass PG (manuscript reading station) from the manuscript medium tray TG1 laid in piles and the manuscript medium tray TG1 is discharged. The aforementioned main part U2 of image formation equipment has UI (user interface), the exposure optical system A, etc. with which a user does alter operation of the operation command signals, such as a copy start. The reflected light from the manuscript (not shown) placed on platen glass PG with the manuscript or hand control by which platen glass PG conveyance is carried out by the aforementioned automatic manuscript transport device U2 is changed into the electrical signal of R (red), G (green), and B (blue) by CCD (solid state image pickup device) through the aforementioned exposure optical system A. installation performance specification (image-processing system) changes the electrical signal of Above RGB into the image data of K (black), Y (yellow), M (Magenta), and C (cyanogen), memorizes it temporarily, and outputs the aforementioned image data to the laser drive circuit DL to predetermined timing.
[0004] The front face of the image support (photo conductor drum) PR rotated in the arrow Ya direction is uniformly charged with the electrification vessel CR in the electrification field Q0, and passes through the latent-image formation position Q1, the development field Q2, and the primary imprint field Q3 one by one. ROS (latent-image write-in equipment) driven by the aforementioned laser drive circuit DL carries out an exposure scan in the aforementioned latent-image formation position Q1 by the laser beam L, and forms an electrostatic latent image in an image support PR front face. The electrostatic latent image corresponding to [when forming a full color picture] the picture of four colors of K (black), Y (yellow), M (Magenta), and C (cyanogen) is formed one by one, and when it is a monochrome picture, only the electrostatic latent image corresponding to K (black) picture is formed.
[0005] It rotates and the image support PR front face in which the aforementioned electrostatic latent image was formed passes through the development field Q imprint [2 or primary] field Q3 one by one.

The developer G of rotary system has the development counters GK, GY, GM, and GC of four colors of K (black), Y (yellow), M (Magenta), and C (cyanogen) which rotate one by one to the aforementioned development field Q2 with rotation of the axis of rotation GA. The development counters GK, GY, GM, and GC of each aforementioned color have the development roll GR which conveys a developer to the aforementioned development field Q2, and develop the electrostatic latent image on the image support PR which passes through the development field Q2 in the toner image Tn. 2 component developer which has a toner and a carrier as a developer is used, and the toner of negative-electrode electrification nature is used as a toner of yellow, a magenta, cyanogen, and black.

[0006] Under the aforementioned image support PR, the slide frame F1 (it displays by the two-dot chain line) is supported possible [slide movement to order (direction perpendicular to space)] with the slide rails SR and SR of a right-and-left couple. The belt frame F2 of the belt module BM is supported up and down by the slide frame F1 possible [rotation] at the circumference of hinge shaft F2a. The aforementioned belt module BM has two or more belt support rolls (Rd, Rt, Rw, Rf, T2a) supported possible [a rotation of the aforementioned middle imprint belt (belt-like middle imprint object) B], the primary transfer roller T1, and the aforementioned belt frame F2 which supports them. Two or more aforementioned belt support rolls (Rd, Rt, Rw, Rf, T2a) contain the belt driving roll Rd, a tension roll Rt, the walking roll Rw, the idler roll (free roll) Rf, and back-up-roll T2a.

[0007] The imprint voltage of the electrification polarity of a toner and reversed polarity is impressed by the power circuit E which Controller C controls, and the aforementioned primary imprint machine T1 imprints the primary toner image Tn of the aforementioned image support PR front face to the middle imprint belt B in the primary imprint field Q3. In the case of a full color picture, the primary toner image Tn of each color formed in an image support PR front face one by one is imprinted one by one by the middle imprint belt B front face in piles in the aforementioned primary imprint field Q3, and, finally, a full color multiplex toner image is formed on the middle imprint belt B. In forming a monochromatic monochrome color picture, it uses only one development counter, and the primary monochrome toner image is imprinted on the middle imprint belt B. After a primary imprint, a remains toner is cleaned with the image support cleaner CLp, and an image support PR front face is discharged with the image support electric discharge vessel JR.

[0008] The secondary imprint slide frame Fs in which slide movement to order (direction perpendicular to space) is possible is supported removable to the main part of image formation equipment by the lower part of the aforementioned back-up-roll T2a with the slide rails SR and SR of a right-and-left couple. The secondary imprint rise-and-fall frame Ft of the secondary imprint unit Ut supported up and down by the aforementioned secondary imprint slide frame Fs possible [rotation] at the circumference of the hinge shaft Fta can be gone up and down between the evacuation positions which rose and which and descended. [positions] [use] The aforementioned secondary imprint unit Ut has secondary transfer roller T2b, the secondary transfer roller cleaner CL 3 and the roll support lever Lr, the sheet guide SG2 after an imprint, and the sheet conveyance belt BH and the aforementioned secondary imprint rise-and-fall frame Ft which supports them.

[0009] The aforementioned roll support lever Lr is a lever which supports the aforementioned secondary transfer roller T2b. In the state where the aforementioned secondary imprint unit Ut moved to the aforementioned operating position, it rotates to the circumference of the hinge shaft La by the motor which is not illustrated, and the aforementioned roll support lever Lr moves the aforementioned secondary transfer roller T2b between the positions in readiness distant from the secondary imprint position and the middle imprint belt B in contact with the aforementioned middle imprint belt B. The secondary imprint field Q4 is formed of the surface of action of aforementioned secondary transfer roller T2b and the aforementioned middle imprint belt B, and the secondary imprint machine T2 is constituted by metal electrode roll T2c which contacts aforementioned secondary transfer roller T2b, aforementioned back-up-roll T2a, and back-up-roll T2a.

[0010] To predetermined timing, it is taken out by the pick up roll Rp, and sells, one sheet dissociates at a time with Roll Rs, and record sheet S held in the medium tray TR1 is conveyed by the register roll Rr. Record sheet S conveyed by the aforementioned register roll Rr doubles timing with the multiplex toner

image or monochrome toner image imprinted [aforementioned] the 1st order moving to the secondary imprint field Q4, and is conveyed from the sheet guide SG1 before an imprint to the secondary imprint field Q4. In case record sheet S passes through the aforementioned secondary imprint field Q4, secondary imprint voltage of the electrification polarity of a toner and like-pole nature is impressed to electrode roll T2c of the secondary imprint machine T2 from the power circuit E which Controller C controls. The aforementioned secondary imprint machine T2 bundles up the color toner image imprinted in piles by the primary aforementioned middle imprint belt B in the aforementioned secondary imprint field, and imprints it the 2nd order to record sheet S. As for the middle imprint belt B after a secondary imprint, a remains toner is removed by the belt cleaner CLb. Moreover, as for the aforementioned secondary transfer roller T2b, a surface adhesion toner is recovered by the secondary transfer roller cleaner CL 3.

[0011] In addition, aforementioned secondary transfer roller T2b and the belt cleaner CLb are arranged free [a disjunction (isolation and contact)] to the middle imprint belt B, and they are being isolated from the middle imprint belt B until the primary non-established toner image of the last color is imprinted by the middle imprint belt B, when a color picture is formed. The aforementioned record sheet S by which the secondary toner image was imprinted is conveyed to the fixing field Q5 with the after [an imprint] sheet guide SG2, and the sheet conveyance belt BH, and in case it passes through the fixing field Q5, heating fixing of it is carried out by the fixing equipment F which has the fixing roll of the couple constituted by a heating roller Fh and the pressure roll Fp. Record sheet S fixed to the toner image is discharged by the record sheet eccrisis tray TR2. The sheet transport device SH is constituted by the element shown with the aforementioned signs Rp, Rs, Rr, SG1, SG2, and BH.

[Translation done.]

* NOTICES *

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DESCRIPTION OF DRAWINGS

[Brief Description of the Drawings]
[Drawing 1] Drawing 1 is the whole image formation equipment explanatory drawing of the example 1 of this invention.
[Drawing 2] Drawing 2 is drawing showing the composition of the middle imprint belt currently used in the example 1 of the image formation equipment of this invention.
[Drawing 3] Drawing 3 is the block diagram of the control section of the aforementioned example 1.
[Drawing 4] Drawing 4 is the timing diagram of the primary imprint machine T1 of an example 1, the middle imprint object potential regulator K, the secondary imprint machine T2, and the optical irradiation electric discharge machine JK.
[Drawing 5] It is drawing showing the toner image in the case of drawing 5 using the photoconductivity middle imprint object B of high resistance of an example 1 (middle imprint belt), and imprinting a toner image on the middle imprint object B from the image support (photo conductor) PR, and the potential of the circumference. Drawing showing that potential (- potential) rises whenever it repeats a primary imprint in drawing in which drawing 5 A shows the potential on the image support PR, and drawing in which drawing 5 B shows the potential on the middle imprint object B, Since the difference of the picture potential of a middle imprint object B front face and non-picture potential became small, drawing and drawing 5 C which shows that the potential of a middle imprint body surface falls by exposing drawing 5 B' after the 4th primary imprint is drawing showing the state where the breadth to the non-picture section of secondary imprint electric field was lost.
[Drawing 6] Drawing 6 is explanatory drawing of the mechanism of the potential adjustment at the time of using corotron as a middle imprint object potential regulator. Drawing 6 A the direct current voltage impressed to corotron The picture section on a middle imprint belt, Explanatory drawing in the state where the potential of the picture section at the time of setting it as the middle potential of the non-picture section and the non-picture section changes, Drawing 6 B is drawing showing the potential state of the picture section after drawing and the drawing 6 C potential which show signs that the potential of the picture section and the non-picture section changes change, and the non-picture section, when corotron carries out corona discharge.
[Drawing 7] Drawing 7 is the timing diagram of the primary imprint machine T1 of an example 3, the middle imprint object potential regulator K, the secondary imprint machine T2, and the optical irradiation electric discharge machine JK.
[Drawing 8] Drawing 8 is explanatory drawing of the conventional image formation equipment which used the middle imprint object.
[Drawing 9] Drawing 9 uses a photoconductivity middle imprint object of high resistance like aforementioned Japanese Patent Application No. No. (publication-number -number official report) 123999 [ten to]. In drawing showing the toner image in the case of imprinting a toner image, and the potential of the circumference on a middle imprint object from an image support (photo conductor) Drawing in which drawing 9 A shows the potential on an image support, drawing in which drawing 9 B shows the potential on a middle imprint object, drawing in which drawing 9 B' shows the potential of a

middle imprint body surface after the 4th primary imprint, and drawing 9 C are drawings showing secondary imprint electric field.

[Description of Notations]

B [-- Fixing equipment, JK / -- Optical irradiation electric discharge machine,] -- A middle imprint object, C7' -- Potential regulator control means, F K [-- Latent-image formation position,] -- A middle imprint object potential regulator, Q0 -- An electrification field, Q1 Q2 [-- A potential coordination area, Q7 / -- An electric discharge field, PR / -- An image support, S / -- The sheet for record, SH / -- A sheet transport device, T imprint / 1--primary / machine T imprint / 2--secondary / machine, TR1 / -- Medium tray.] -- A development field, Q imprint [3--primary] field, Q imprint [4--secondary] field, Q5 -- A fixing field, Q6

[Translation done.]

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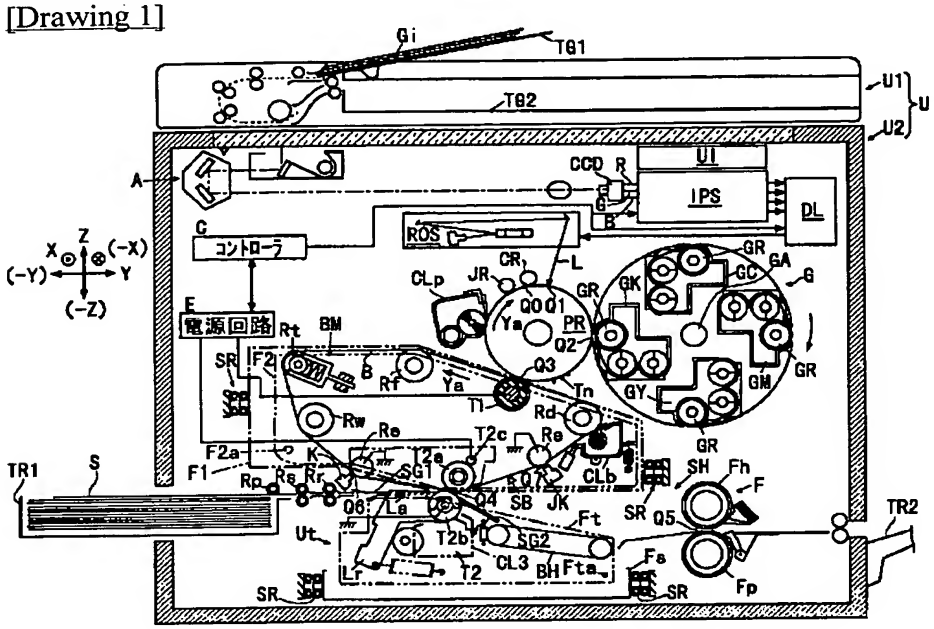
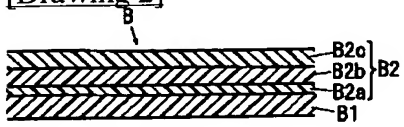
DRAWINGS

[Drawing 1]



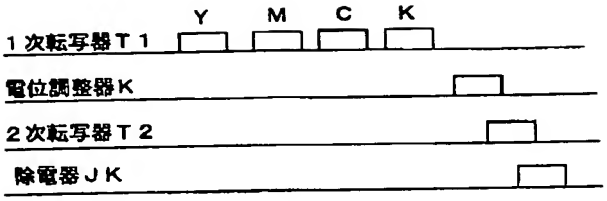
[Drawing 2]



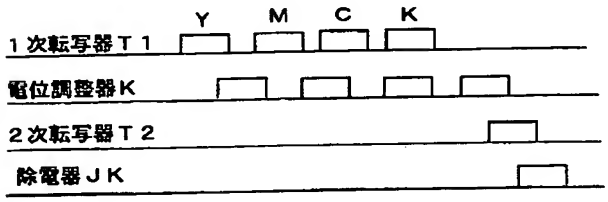
B1: 基材
B2: 光導電層
B2a: ブロッキング層
B2b: 電荷発生層
B2c: 電荷輸送層

[Drawing 4]

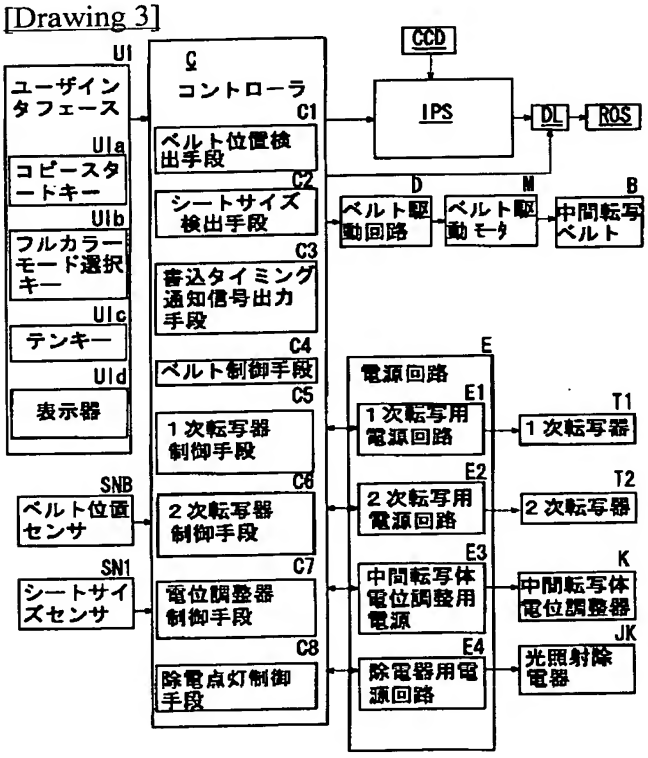
（実施例１）
（実施例２）



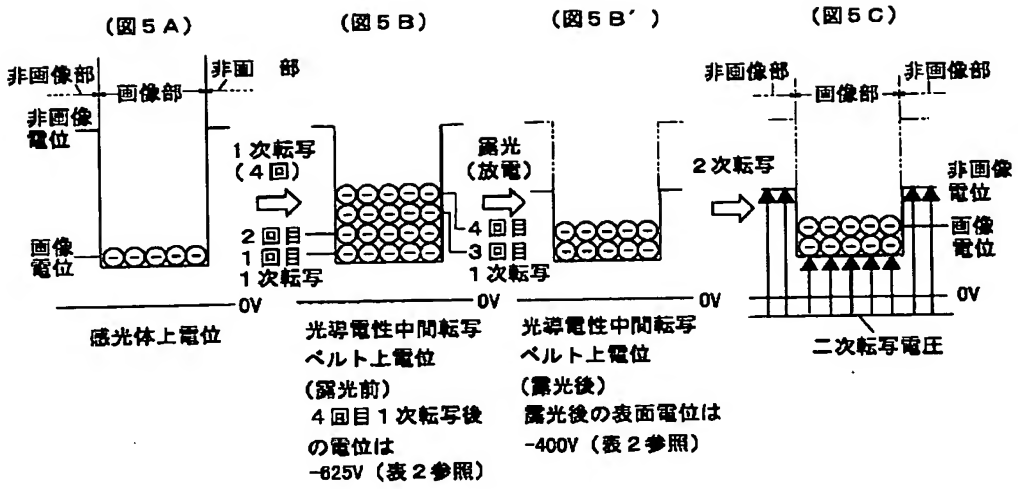
[Drawing 7]
（実施例３）
（実施例４）



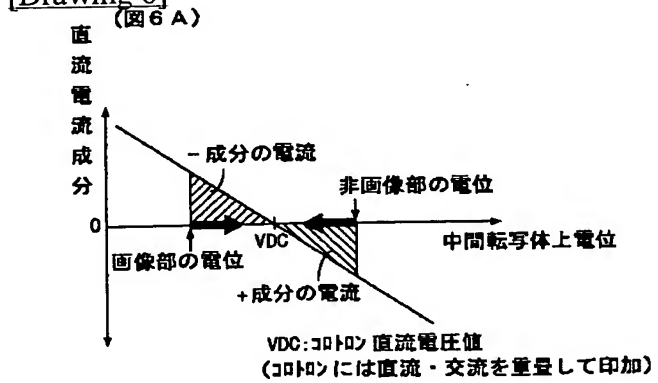
[Drawing 3]

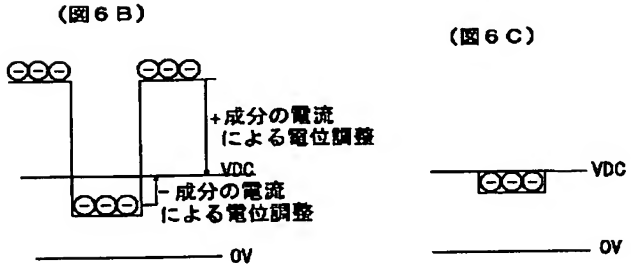


[Drawing 5]

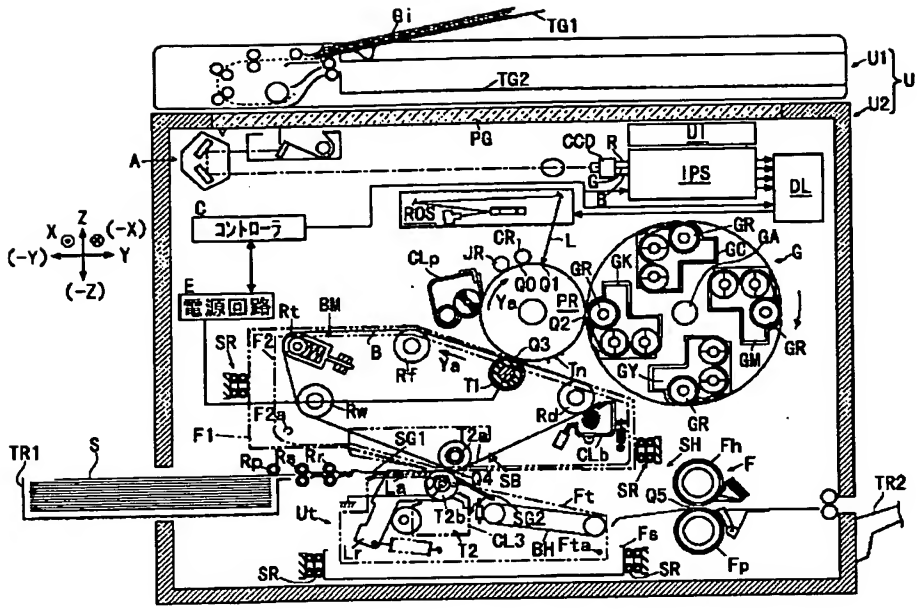


[Drawing 6]

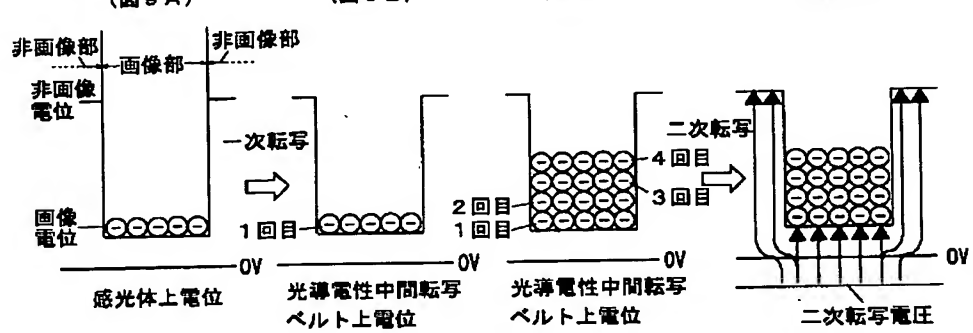




[Drawing 8]



[Drawing 9]



[Translation done.]